City of Sunnyvale

2006 Bicycle Plan




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2006 Bicycle Plan




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VTA railcar images ..... VTA
Proposed MUTCD guide signs ..... National Committee on Uniform Traffic Control Devices
All others ..... City of Sunnyvale or Korve Engineering

Caltrans Bicycle Transportation Account (BTA) Cross-Reference

The state Bicycle Transportation Account (BTA), administered by the Caltrans Bicycle Facilities Unit (BFU), funds projects that improve safety and convenience for bicycle commuters. To apply for BTA funding, Sunnyvale must have a Bicycle Transportation Plan (BTP) addressing items (a) through (k) of Streets and Highways Code Section 891.2, adopted no earlier than four years prior to July 1 of the fiscal year in which BTA funds are granted. The City must adopt the BTP or certify that it has been updated and complies with Section 891.2 and the Regional Transportation Plan (RTP), after which the Metropolitan Transportation Commission (MTC), the Bay Area's Metropolitan Planning Organization (MPO), must also certify this. The City then submits the BTP to Caltrans.

This Plan satisfies each of the 11 Bicycle Transportation Account requirements as follows:

Caltrans Bicycle Transportation Account (BTA) requirement		Plan Section
a	The estimated number of existing bicycle commuters in the plan area and the estimated increase in the number of bicycle commuters resulting from implementation of the plan.	2.3
b	A map and description of existing and proposed land use and settlement patterns which shall include, but not be limited to, locations of residential neighborhoods, schools, shopping centers, public buildings, and major employment centers.	2.2
c	A map and description of existing and proposed bikeways.	2.1
d	A map and description of existing and proposed end-of-trip bicycle parking facilities. These shall include, but not be limited to, parking at schools, shopping centers, public buildings, and major employment centers.	2.5
e	A map and description of existing and proposed bicycle transport and parking facilities for connections with and use of other transportation modes. These shall include, but not be limited to, parking facilities at transit stops, rail and transit terminals, ferry docks and landings, park and ride lots, and provisions for transporting bicyclists and bicycles on transit or rail vehicles or ferry vessels.	2.4 (Transit) 2.5 (Parking)
f	A map and description of existing and proposed facilities for changing and storing clothes and equipment. These shall include, but not be limited to, locker, restroom, and shower facilities near bicycle parking facilities.	2.5
g	A description of bicycle safety and education programs conducted in the area included within the plan, efforts by the law enforcement agency having primary traffic law enforcement responsibility in the area to enforce provisions of the Vehicle Code pertaining to bicycle operation, and the resulting effect on accidents involving bicyclists.	2.6 (Safety) 2.7 (Education)
h	A description of the extent of citizen and community involvement in development of the plan, including, but not limited to, letters of support.	1.3
i	A description of how the bicycle transportation plan has been coordinated and is consistent with other local or regional transportation, air quality, or energy conservation plans, including, but not limited to, programs that provide incentives for bicycle commuting.	1.2
j	A description of the projects proposed in the plan and a listing of their priorities for implementation.	5.4 (CIP)
k	A description of past expenditures for bicycle facilities and future financial needs for projects that improve safety and convenience for bicycle commuters in the plan area.	5.5 (CIP)

1 Introduction

1.1 Overview

ENVIRONMENT

The City of Sunnyvale is home to 133,086 residents and is located in the heart of Silicon Valley, 40 miles south of San Francisco and five miles north of San Jose. Home to many world-class technology companies, its workforce population is approximately 72,400. The City's essentially flat terrain, moderate size, mild Bay Area climate, well-connected suburban street network, neighborhood schools and parks, bicycle-friendly transit systems, and multi-use paths and trails make it an ideal place for year-round "utility" and recreational bicycling by persons of all ages. The 175-acre Baylands Park, located in the northeast corner of the City, features developed recreational facilities, a large wetlands preserve, and segments of the San Francisco Bay Trail that connect to neighboring cities.

RECENT HISTORY

In the 13 years that have passed since the Sunnyvale's most recent comprehensive Bicycle Plan (1993), the City and its environment have changed significantly. A downtown revitalization was launched several years ago, and significant office buildings have created a skyline along Mathilda Avenue. Historic Murphy Street, downtown's "restaurant row", is envisioned to be joined to a new mixed-use town center. In 1993 Caltrain commuter trains were preparing to accommodate bicycles aboard for the first time; they now provide dedicated on-board space and carry hundreds of bicyclists every day. Santa Clara County's Light Rail network now serves Sunnyvale's Tasman Drive and Moffett Park areas; its railcars have dedicated bicycle spaces. All of VTA's buses, and almost all other transit buses in the region, now have two-bike front-mounted racks.

The City has complemented these changes with steady expansion of its bikeway network. Three new bicycle-pedestrian bridges will span Sunnyvale's freeways by 2010, providing direct and comfortable connections between residences and workplaces in Moffett Park at the City's north end, and Cupertino to the south. Large and small bikeway network improvements are now coordinated by the City's Bicycle Capital Improvement Program (CIP), created in 2000. Key practices for on-street bicycle accommodation have been "institutionalized" by the City's staff.

ABOUT THIS PLAN

This Bicycle Plan continues Sunnyvale's development of bicycling infrastructure, practices, and policies, all intended to provide a convenient transportation alternative to motor vehicles. It describes current Community Conditions relevant to utility and recreational bicycling, including existing and planned facilities of Sunnyvale and its neighboring jurisdictions. To carry Sunnyvale through its next decade, the Plan updates the Bicycle Capital Improvement Program and the Goals, Policies, and Action Statements that guide all bicycling improvements.

The goals of the City's bicycle program include continued build-out of the bikeway network to facilitate commute and recreational trips, development of additional policies and standards to support bicycling in city government and at workplaces, enhancement of education options and their availability for both bicyclists and motorists, and continuation of effective law enforcement.

It is recommended that this Plan be reviewed and updated at least every ten years so that it continues to reflect Sunnyvale's current and planned bicycle program.

1.2 Relationship to Other Studies, Plans, and Projects

Several planning documents by the City and other agencies affect Sunnyvale's physical and policy environments for bicycling. Reference information used in developing this Plan is listed in Appendix F. Some of the following plans are described in more detail in Section 2: Community Conditions.

SUNNYVALE STUDIES, PLANS AND PROJECTS

SUNNYVALE GENERAL PLAN

This Bicycle Transportation Plan is consistent with the Sunnyvale General Plan's Land Use and Transportation Element (LUTE). Several Action Statements in that Element directly address bicycling; these are listed in Table 4.1 in this Plan's Goals, Policies and Action Statements section. This Plan is also consistent with the Energy Element and Air Quality Sub-Element of the General Plan, which have been determined by the City Council to be consistent with the Bay Area Clean Air Plan.

SUNNYVALE MUNICIPAL CODE

Sunnyvale's Municipal Code addresses bicycling in two sections: Title 10 (Vehicles and Traffic) and Title 19 (Zoning). Appendix B summarizes their bicycle-related provisions.

MOFFETT PARK SPECIFIC PLAN

The Moffett Park Specific Plan, completed in 2002, guides development of Sunnyvale's major office/industrial area north of Highway 237. It creates a zoning category to provide incentives for higher-density walkable development near the area's Light Rail stations, and includes bicycle parking standards. This plan is described in more detail in Section 2.2.

DOWNTOWN SPECIFIC PLAN

The 2003 Downtown Specific Plan guides future development of the mostly commercial area bounded by Mathilda Avenue, the Caltrain line, Sunnyvale Avenue, and El Camino. It benefits bicycling by encouraging the re-connection of several streets through the downtown core, and by creating opportunities for more destinations within easy bicycle distance of Sunnyvale residences. The plan recommends bicycle lanes on Iowa, Evelyn, and Sunnyvale Avenues, and these have been implemented on the latter two streets. Its Policy C.7 states "Follow the VTA standards for bicycle parking to the extent possible."

FUTURE STUDY

This 1993 study examined the possibility of rezoning certain industrial and office sites to allow development of multifamily housing ("Industrial-To-Residential", or ITR) or higher-density commercial/industrial use. Several of these sites are being built out, and the increased density combined with proximity to other Sunnyvale destinations is expected to generate new bicycle trips.

TASMAN/FAIR OAKS PEDESTRIAN AND BICYCLE PLAN

One ITR site is located at the intersection of Tasman Drive and Fair Oaks Avenue. Its new medium- and high-density housing will add bicycle trips to work and nearby schools. The adjacent Fair Oaks Light Rail station will support bike-on-transit trips.

MATHILDA AVENUE BRIDGE REHABILITATION PROJECT

The City plans to reconstruct the Mathilda Avenue bridge over the Caltrain line between California Avenue and Washington Avenue. The project will include replacement of the existing southbound exit ramp to westbound Evelyn Avenue with a loop ramp that terminates at a new signal that will allows turns onto both directions of Evelyn.

The existing bridge and its southbound exit ramp to westbound Evelyn Avenue have neither bike lanes nor striped shoulders. The widened bridge is planned to have five-foot shoulders and the new exit ramp will have an eight-foot shoulder. Charles Street's intersection with Evelyn will be replaced with a street closure that preserves through bicycle travel to and from Evelyn.

STUDIES, PLANS AND PROJECTS BY OTHER AGENCIES

2000 VTA COUNTYWIDE BICYCLE PLAN

The Santa Clara Valley Transportation Authority (VTA) published a countywide bicycle plan in 2000. It describes a network of 16 cross-county routes, seven of which traverse Sunnyvale as described in Table 1.1. Projects on these corridors receive extra points in VTA's ranking system for funding that it administers. As of 2006, an update of the Countywide plan was in progress; it may expand the cross-county route network.

2001 MTC BAY AREA REGIONAL BICYCLE PLAN

The Metropolitan Transportation Commission (MTC), the 9-county Bay Area's Metropolitan Planning Organization (MPO), published a Regional Bicycle Plan in 2001. This Plan identified a Regional Bikeway Network with several segments within and through Sunnyvale. Regional route segments are also summarized in Table 1.1.

Table 1.1
Countywide and Regional Bicycle Routes in Sunnyvale

Street	From	To	VTA Cross-County	MTC Regional	Completed
Arques	Wolfe	E City Limit (Scott Blvd)	1	x	Yes
Bay Trail	W City Limit	E City Limit	11	x	Yes
Borregas	Maude	Bay Trail	14	x	Yes
Crossman	Moffett Park Drive	Fair Oaks	8		Yes
Elko	Lawrence	Reamwood	8		Yes
Evelyn	Sunnyvale	E End (Reed)	13		Yes
Fair Oaks	Crossman	Fair Oaks Way	8		No
Fair Oaks Way	Fair Oaks	Persian	8		No
Homestead	W City Limit (Foothill Expwy)	E City Limit	2	x	Yes
Mary	Homestead	Moffett Park Drive	3		No
Maude	W City Limit (to Middlefield)	Wolfe (end)	1, 14	x	Partially
Moffett Park Drive	W City Limit (Manila)	Caribbean (Hwy 237 path)	8	x	Partially
Persian	Fair Oaks Way	Lawrence	8		Yes
Reamwood	Elko	Tasman	8		Yes
Reed	Evelyn	E City Limit (Monroe)	13		Yes
Saratoga-Sunnyvale	Homestead	Sunnyvale		x	Yes
Sunnyvale	Saratoga-Sunnyvale	Maude		x	Partially
Sunnyvale	Washington	Evelyn	13		Yes
Tasman	Reamwood	E City Limit	8		No
Washington	W City Limit (Dana St)	Sunnyvale	13		No
Wolfe	Fair Oaks (N end)	S City Limit	14		Yes
Wolfe	Maude	Arques	1	x	Yes

SAN FRANCISCO BAY TRAIL

The Bay Trail Project is a nonprofit organization administered by the Association of Bay Area Governments (ABAG) that coordinates the implementation of the Bay Trail. When complete, the Bay Trail will be a continuous 500-mile network that will encircle San Francisco and San Pablo Bays. The Bay Trail is enjoyed by walkers and recreational cyclists. Some segments also attract bicycle commuters, depending on total trip distance.

To date over half of the Bay Trail's proposed length has been developed, including its entire length within the city limits as shown in Figure 1.1 and described in Table 1.2. These segments appear in green on the City's Bike Map. Figure 1.1 also shows existing and future connecting trails in purple: Stevens Creek Trail in Mountain View, San Tomas Aquino Creek Trail in Santa Clara, and the Guadalupe River Trail in San Jose. The yellow arrow illustrates a future Bay Trail connection opportunity, described below.

Figure 1.1
Bay Trail South Bay map – Moffett Field, Sunnyvale, and Alviso areas

Table 1.2
Existing Sunnyvale Bay Trail segments

Type	Location	Paved	Notes
Trunk	Mathilda Avenue to Calabazas Creek	No	Link via Mathilda sidewalk to Bordeaux Dr. signal, and to Borregas Ave. via Carl Rd. (Smart Station recycling plant access road)
Loop	Ponds between Mathilda and Borregas	No	Access to Bay Trail trunk near Carl Rd.
Spur	Along the Sunnyvale Baylands Park frontage road from Caribbean Drive to Calabazas Creek	Yes	Connects to Bay Trail in Santa Clara, and San Tomas Aquino Creek under Hwy 237

Sunnyvale's Legislative Policy considers the federal lands currently occupied by Moffett Federal Airfield to be within the City's sphere of influence. Policy B.2 of the Sunnyvale General Plan's Open Space Sub-Element states "Pursue the acquisition of federal lands currently located at Moffett Naval Air Station".

Bay Trail Project planning documents describe a gap across Moffett Field between Mountain View's Shoreline Park/Stevens Creek Trail terminus, and Sunnyvale's Bay Trail segments. As shown by the dotted gray line in Figure 1.1, this gap spans the north edge of Moffett Field, which occupies federal lands between Sunnyvale and Mountain View. Closing this gap would connect Sunnyvale to Mountain View and Palo Alto's trails, enabling Bay-side commutes to Sunnyvale's Moffett Park workplaces and expanding recreational options. ABAG's 2005 Gap Analysis Report estimated the distance at 2.7 miles and the cost at $4.1 million. Bay Trail staff noted that this preferred alignment has significant implementation issues including security of the runway and nearby munitions storage, and contamination.

NASA AMES RESEARCH CENTER DEVELOPMENT PLAN

The Moffett Field complex includes NASA's Ames Research Center, which is in the process of preparing for redevelopment. The Ames Development Plan Final Programmatic Environmental Impact Statement (EIS), dated July 2002, states:

"Development cleared under the CANG and CUP EAs [California Air National Guard and Comprehensive Use Plan Environmental Assessments] will consist of the following elements: …

- *The granting of an easement for a future segment of the Bay Trail along Ames Research Center's northeastern border. In order for this easement to be safe for public use, the ordnance in the affected munitions bunkers would be relocated to existing bunkers within the golf course in the Eastside/Airfield area."*

NASA and ABAG have signed a Memorandum of Understanding (MOU) for Bay Trail planning.

SOUTH BAY SALT PONDS RESTORATION PROJECT

The South Bay Salt Ponds Restoration Project is designing and managing the transformation of hundreds of acres of ponds in the southern half of San Francisco Bay from salt production to wildlife habitat. This project proposed to close the above-described Bay Trail gap across Moffett Field via an alternate alignment on pond levees designed by this project. Its Phase 1 Final Alternatives Report details two pond management schemes, Alternatives B and C, both of which enable this connection as described in Section 6.2.3 (Public Access, Alternative B):

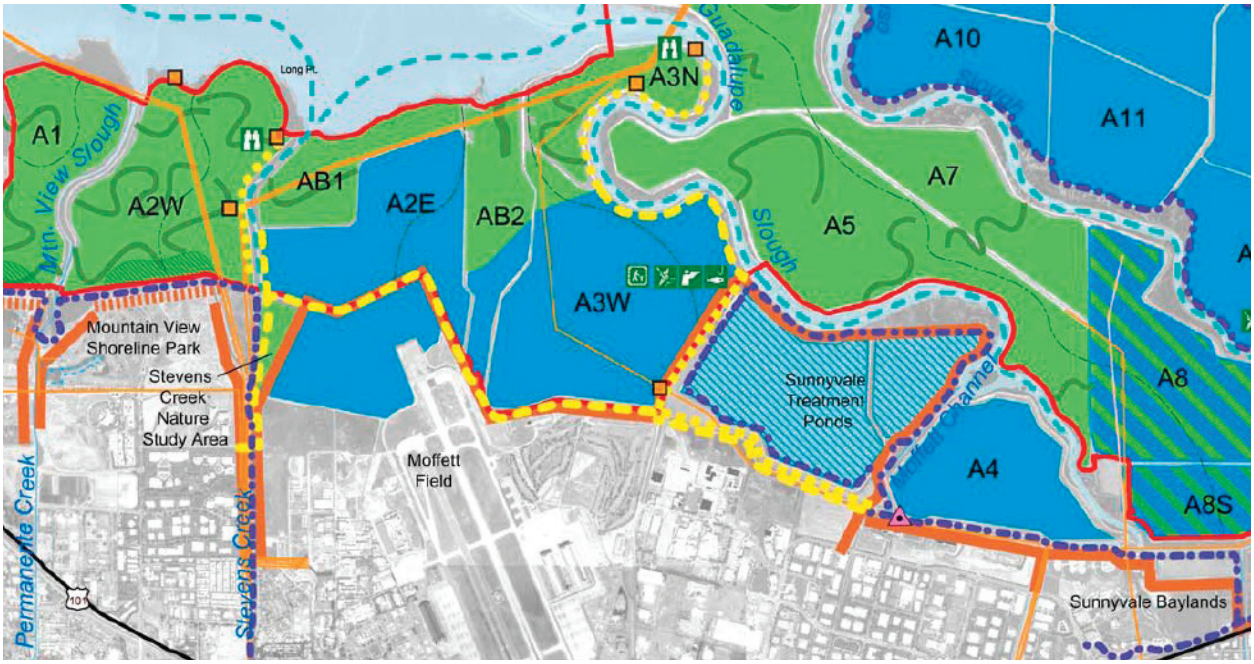
A year-round trail [would extend] east from the Stevens Creek Trail, along a proposed flood control levee connecting it to proposed and existing trails around the Sunnyvale Treatment Ponds...

This connection is shown in yellow-red in Figure 1.2, copied from that report. The route would traverse Pond A2E and the south edge of Pond A3W. The U.S. Fish and Wildlife Service anticipates opening the trail in mid-2008.

The long-term alignment would use a new flood control levee (solid orange line) to be constructed later. The intended levee currently has a soft surface and is inaccessible during the rainy season. A stabilized gravel surface would better accommodate year-round bicycle use, though a paved trail would be optimal for both commuting and recreation.

The alignment options for the Bay Trail in the Moffett Field area are largely dictated by the presence and suitability of pond levees and maintenance roadways, tempered by the need for adequate clearance around the end of the runway and stored ordinance. In contrast, it seems likely that the choice of Trail surface is something that input from agencies such as the City of Sunnyvale can affect.

Figure 1.2
Salt Ponds Restoration Project Moffett Field trail segment
Phase 1 Action map – Alviso Alt B, 10/21/2005



CONNECTIONS EAST OF SUNNYVALE BAYLANDS PARK

The current Bay Trail alignment east of Calabazas Creek, the Sunnyvale city limit, follows the Gold Street Connector – a frontage road along the north side of Highway 237 – to the Lafayette Street/Gold Street interchange. Midway along this frontage road the Trail connects to the City of Santa Clara's San Tomas Aquino Creek Trail at its undercrossing of Highway 237. The San Tomas Aquino Creek Trail continues south, crossing under US-101 to its current terminus at Scott Boulevard.

The City of San Jose plans to extend the Guadalupe River Trail, whose north terminus is currently at I-880, all the way to the Bay with a final terminus at Gold Street near Alviso Marina. Completion of the Guadalupe River Trail will create an opportunity for a Bay-side alignment of the Bay Trail trunk between Sunnyvale Baylands Park and Alviso along levees running east from the Twin Creeks softball complex. This potential link is shown by the yellow arrow in Figure 1.1.

CITY OF MOUNTAIN VIEW

ON-STREET BIKEWAYS

Mountain View's 2003 Bicycle Transportation Plan shows six existing or planned bikeways connecting to Sunnyvale or near the Sunnyvale city limit:

Table 1.3
City of Mountain View bikeways near or connecting to Sunnyvale

Bikeways (north to south)	Type	Sunnyvale connection
Manila Drive (east of Ellis Street and the Bayshore Light Rail Station)	Bike Lanes	Manila continues east, with bike lanes, as a County road that connects to H Street and Moffett Park Drive in Sunnyvale.
E. Middlefield Road	Bike Lanes	Middlefield Road ends at Central Expressway, a County facility that has striped shoulders
E. Dana Street	Bike Route	Becomes Washington Avenue, which continues through downtown Sunnyvale. Washington is an unsigned "Beginner"-rated route on Sunnyvale's bike map. There is a street closure at the city limit but bicycles can proceed past the barrier along the curb.
Dale Avenue/Heatherstone Way	Signed Bike Route	Heatherstone continues into Sunnyvale across Knickerbocker Drive, a Sunnyvale street with bike lanes.
Stevens Creek Trail	Path (existing, planned)	Currently ends just north of El Camino Real. Planned extension will connect to Heatherstone Way, which connects to Knickerbocker Drive in Sunnyvale.
Bryant Avenue	Bike Lanes	None currently; bike lanes end at Mountain View High School. See Stevens Creek Trail discussion for possible future connection to Sunnyvale via Remington Drive.

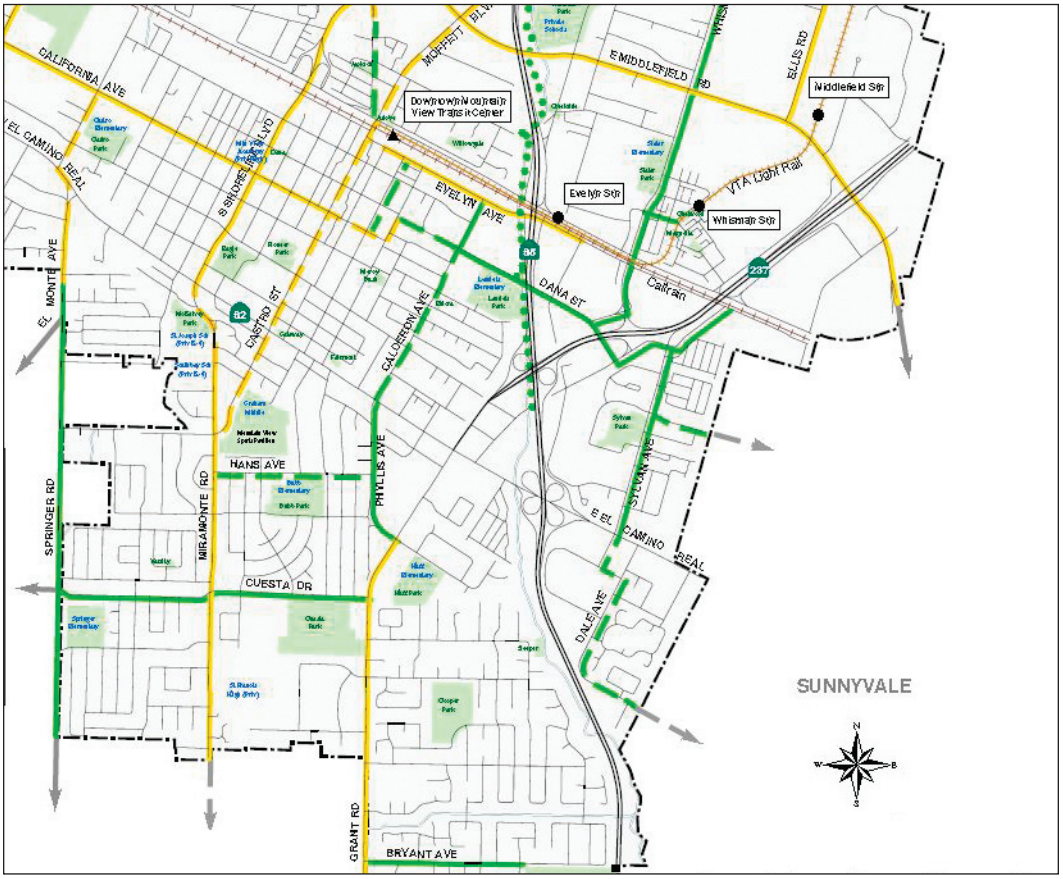
The City of Mountain View indicated that it has no current plans to expand its on-street bikeway network near Sunnyvale.

STEVENS CREEK TRAIL

The Stevens Creek Trail follows Stevens Creek within and adjacent to the Highway 85 (Stevens Creek Freeway) right of way. Since the early 1990s, Mountain View has been constructing the Trail southward from San Francisco Bay, and the Trail now extends almost to El Camino Real, with its southernmost access point at Yuba Drive on the west side of the creek.

The City of Mountain View plans to extend the Stevens Creek Trail south of El Camino Real. The next phase ("Reach 4") is planned to extend to Sleeper Avenue and to bridge the Creek to the corner of Dale Avenue and Heatherstone Way, both of which are Bike Routes (Class III bikeways). That corner is one block from Knickerbocker Drive in Sunnyvale, so the creek bridge would provide Sunnyvale residents with access to the Trail.

Figure 1.3
Dale Ave./Heatherstone Way area



Blue dots = Planned Stevens Creek Trail
Solid yellow and green = bike lanes
Dashed green = bicycle routes

This phase is being funded and implemented in three pieces as described in Table 1.4.

Table 1.4
Stevens Creek Trail - next phase ("Reach 4") implementation status

#	From (north or west endpoint)	To (south or east endpoint)	Status
1	Yuba Drive	Just south of El Camino Real, via new undercrossing of that roadway	Design completion expected June 2006. Construction completion expected Summer 2007
2	Just south of El Camino Real	Sleeper Avenue	Unfunded
3	Sleeper Avenue	Dale Avenue, via new overcrossing of Stevens Creek. This overcrossing would create access to Sunnyvale streets via Heatherstone Way.	Unfunded

When Reach 4 is completed, Mountain View will consider extending the Trail to Mountain View High School, its southern limit within that City, as depicted in Mountain View's 2003 Bicycle Transportation Plan. That segment will probably use a thin sliver of Mountain View land east of the freeway to near Bryant Avenue, then bridge back over to the High School. The "high school" bridge would be close to the intersection of Remington Drive and Robin Way in Sunnyvale.

Trail development south of the Mountain View High School area would be handled by the City of Sunnyvale, possibly in cooperation with the Town of Los Altos (the Creek runs on the west side of Highway 85 south of Townsend Terrace). A 1994 feasibility study by Sunnyvale's Parks and Recreation Department, titled "Evaluation of Policy and Planning Issues Related to Proposed Stevens Creek Trail Impacting Sunnyvale" considered both creek-side and on-street Trail alignments. This item went before the City Council on November 29, 1994. Current City policy is to consider on-street Trail alignments.

CITY OF SANTA CLARA

Santa Clara's 2004 Bicycle Map shows six existing or planned bikeways connecting to Sunnyvale or near the Sunnyvale city limit:

Table 1.5
City of Santa Clara bikeways near or connecting to Sunnyvale

Bikeways (north to south)	Type	Sunnyvale Connection
Path from Gold Street along north side of Highway 237	Path	Path continues through Sunnyvale Baylands Park to Caribbean Drive
Calabazas Creek east levee	Path	Sunnyvale has a path on the west levee of Calabazas Creek. A bridge connects the two paths just south of the John W. Christian Greenbelt.
Mission College Boulevard	Unsigned route	Wildwood Avenue currently has no bicycle facility but is in the Bicycle Capital Improvement Plan
Lakeside Drive	Bike Lanes	Bike lanes continue for the full length of Lakeside in Sunnyvale
Scott Boulevard	Bike Lanes	Bike lanes continue on Arques Avenue in Sunnyvale
Central Expressway	Shoulder stripe	Striped shoulders continue through Sunnyvale
Kifer Road	Unsigned route	Kifer Road in Sunnyvale has bike lanes west of Lawrence Expressway
Lawrence Expressway	Shoulder stripe	Shoulder stripes continue along Sunnyvale edge
Poinciana Drive	Bike Lanes	Poinciana ends at Tamarack Lane, which is in the Bicycle Capital Improvement Program
El Camino Real	Unsigned route	El Camino Real is in the Bicycle Capital Improvement Program
Dunford Way	Unsigned route	Dunford Way is in the Bicycle Capital Improvement Program
Homestead Road	Unsigned route	Homestead Road has bike lanes in Sunnyvale

The routes shown on Santa Clara's most recent Bicycle Map represent all existing and planned bikeways adjacent to Sunnyvale.

Santa Clara traffic engineering staff communicates frequently with Sunnyvale staff on transportation issues involving both cities.

CITY OF CUPERTINO

ON-STREET BIKEWAYS

Cupertino's current Bicycle Map shows five bikeways connecting to Sunnyvale.

Table 1.6
City of Cupertino bikeways near or connecting to Sunnyvale

Bikeways (west to east)	Type	Sunnyvale Connection
Stelling Road	Bike Lanes	Terminates at Homestead Road, which has bike lanes
N. DeAnza Boulevard	Bike Lanes	Becomes Sunnyvale-Saratoga Road, which has bike lanes
Blaney Avenue	Bike Lanes	Terminates at Homestead Road, which has bike lanes
Wolfe Road	Bike Lanes	Bike lanes continue into Sunnyvale
Tantau Avenue	Bike Lanes	Intersects with Homestead Road, which has bike lanes, and becomes Quail Avenue, which is in the Bicycle Capital Improvement Plan

Staff of Cupertino's Public Works Department stated that the routes shown on Cupertino's most recent Bicycle Map represent all existing and planned bikeways adjacent to Sunnyvale except for the planned Mary Avenue/I-280 pedestrian-bicycle bridge described elsewhere in this document.

MARY AVENUE/I-280 OVERCROSSING

As described elsewhere in this Plan, the Mary Avenue overcrossing of I-280 will connect Mary Avenue in Sunnyvale to Mary Avenue in Cupertino via path segments north and south of the overcrossing.

CITY OF LOS ALTOS

ON-STREET BIKEWAYS

The City of Los Altos has two bikeways that connect to Sunnyvale:

Table 1.7
City of Los Altos bikeways near or connecting to Sunnyvale

Bikeways (west to east)	Type	Sunnyvale Connection
Fremont Avenue	Bike Lanes	Bike lanes continue for the full length of Fremont Avenue in Sunnyvale
Homestead Road	Bike Lanes	Bike lanes continue for the full length of Homestead Road in Sunnyvale

No additional on-street bikeways are planned near the city limit.

STEVENS CREEK TRAIL

The City of Los Altos plans to study options for the Stevens Creek Trail within its boundaries.

1.3 Summary of Citizen Involvement in Bicycle Planning

Public involvement in the review and approval of various City actions that comprise elements of this Plan are as follows:

Table 1.8
Citizen and Community Involvement

Document or Program	**Citizen and Community Involvement** (BPAC = Bicycle Pedestrian Advisory Committee)
2006 Bicycle Transportation Plan (this document)	BPAC public hearing for approval of work scope Four BPAC review meetings One public workshop One BPAC public hearing One City Council public hearing Posting of the draft document on the City website Distribution of copies of the draft document to agencies
2000 Long-Range Bicycle Capital Improvement Study	Hearings at five Bicycle and Pedestrian Advisory Committee meetings. City Council approval.
1998 Bicycle Opportunities Study	Hearings at four Bicycle Advisory Committee meetings. City Council approval.
Development of bicycle support facility incentives and requirements for bicycle parking at multi-family residential developments	Two hearings by the Sunnyvale Bicycle Advisory Committee; One Planning Commission public hearing Two Sunnyvale City Council public hearings.
1997 Land Use and Transportation Element of the General Plan	Six joint Planning Commission/City Council study sessions Formation of a 25-member citizen focus group representing a broad range of community interests, and three meetings of this group One day-long community workshop Distribution of 110 copies of the draft to concerned citizens and agencies Notifications of City Council public hearing to 50 additional concerned citizens Presentations to the Sunnyvale Bicycle Advisory Committee and the Housing and Human Services Commission One Planning Commission public hearing One City Council public hearing Announcement of City Council public hearing in the San Jose Mercury News
1993 Bicycle Plan	Five public hearings before the Sunnyvale Bicycle Advisory Committee Distribution of approximately 150 copies of the draft document Notification to nine bicycling organizations Notification of City Council hearing in the Sunnyvale Sun (city newspaper) Public hearing before Sunnyvale City Council
Proposed or completed bicycle projects	Considered by the City Council and/or subject to public hearings when grant applications are authorized or when the annual city budget is approved. City budget adoption involves two public hearings. Individual projects typically also involve community meetings and BPAC public hearings during the project design process.

2 Community Conditions

2.1 Bikeway Network

This section describes Sunnyvale's existing bikeway network. This network consists of on-street bicycle lanes, shared roadways, and shared-use paths and trails.

A **bicycle lane**, or "**bike lane**", is a striped lane on the street, reserved for bicycle travel except for right turn areas at intersections, and for vehicle parking when it is combined with the bike lane. Bike lanes are one-way facilities in which bicyclists travel in the same direction as motor traffic on their side of the street.

A **shared roadway** is a street segment without a striped lane exclusively for bicycle travel, with wide outside through lanes or sufficient total unstriped width that bicyclists can be comfortably passed by faster traffic. Most residential streets are shared roadways.

A **signed shared roadway**, commonly known as a "bike route", is identified by signing as a preferred alignment for any of several reasons listed in the AASHTO Guide for the Development of Bicycle Facilities:

Figure 2.1
Types of Bikeways

(a) Bicycle Lane (b) Shared Roadway (c) Shared-Use Path (d) Trail (unpaved)

a. The route provides continuity to other bicycle facilities such as bike lanes or shared use paths.

b. The road is a common route for bicyclists through a high demand corridor.

c. In rural areas, the route is preferred for bicycling due to low motor vehicle traffic volume or paved shoulder availability.

d. The route extends along local neighborhood streets and collectors that lead to an internal neighborhood destination such as a park, school, or commercial district.

Some of Sunnyvale's shared roadways are signed; others are indicated only by highlighting on the City's bicycle map.

Shared-use paths and trails are two-way off-street facilities for use by nonmotorized traffic including bicyclists, walkers, and skaters. Shared-use paths are paved; trails are unpaved and may not be usable on a bicycle during the rainy season.

Bicyclists have the same origins and destinations as motorists but generally travel at lower speeds, so they value direct and well-connected routes with minimal delays. Sunnyvale's bikeway network segments are primarily on arterial and collectors because those streets maximize directness, minimize stops, and serve the city's primary destinations and workplaces.

Planned improvements are described in detail in Section 5: Bicycle Capital Improvement Program (CIP). Improvements planned in jurisdictions adjacent to Sunnyvale are described in Section 1.2: Relationship to Other Studies, Plans and Projects.

ROADWAY NETWORK

The City's roadway network was largely constructed in the 1950s and 1960s. It forms a one-mile grid of multi-lane arterials, traversed by US-101 (the Bayshore Freeway) and Highway 237 at its north end and bordered by Highway 85, I-280, and Lawrence Expressway to the west, south, and east. North-south arterials include Mary Avenue, Mathilda Avenue, Sunnyvale-Saratoga Road, Fair Oaks Avenue, and Wolfe Road. East-west arterials include Caribbean Drive, Tasman Drive, Arques Avenue, Central Expressway, Kifer Road, El Camino Real (State Route 82), Fremont Avenue, and Homestead Road. Although many of these arterials have bicycle lanes, they can also be obstacles to bicyclists in the cross-direction where signalized cross-streets are infrequent. The Caltrain railroad right-of-way runs east-west through the center of Sunnyvale and is another significant barrier to north-south travel.

Bicyclists also benefit from the half-mile secondary grid of collector streets: Bernardo Avenue, Pastoria/ Hollenbeck Avenue, Borregas Avenue, Sunnyvale Avenue, and Morse Avenue in the north-south direction, Java Drive, Duane Avenue, Maude Avenue, California Avenue, Evelyn Avenue, Remington Drive, and The Dalles Avenue/Alberta Avenue/Inverness Way in the east-west direction.

The City has 79 miles of bike lanes, an increase from 31 miles in 1993.

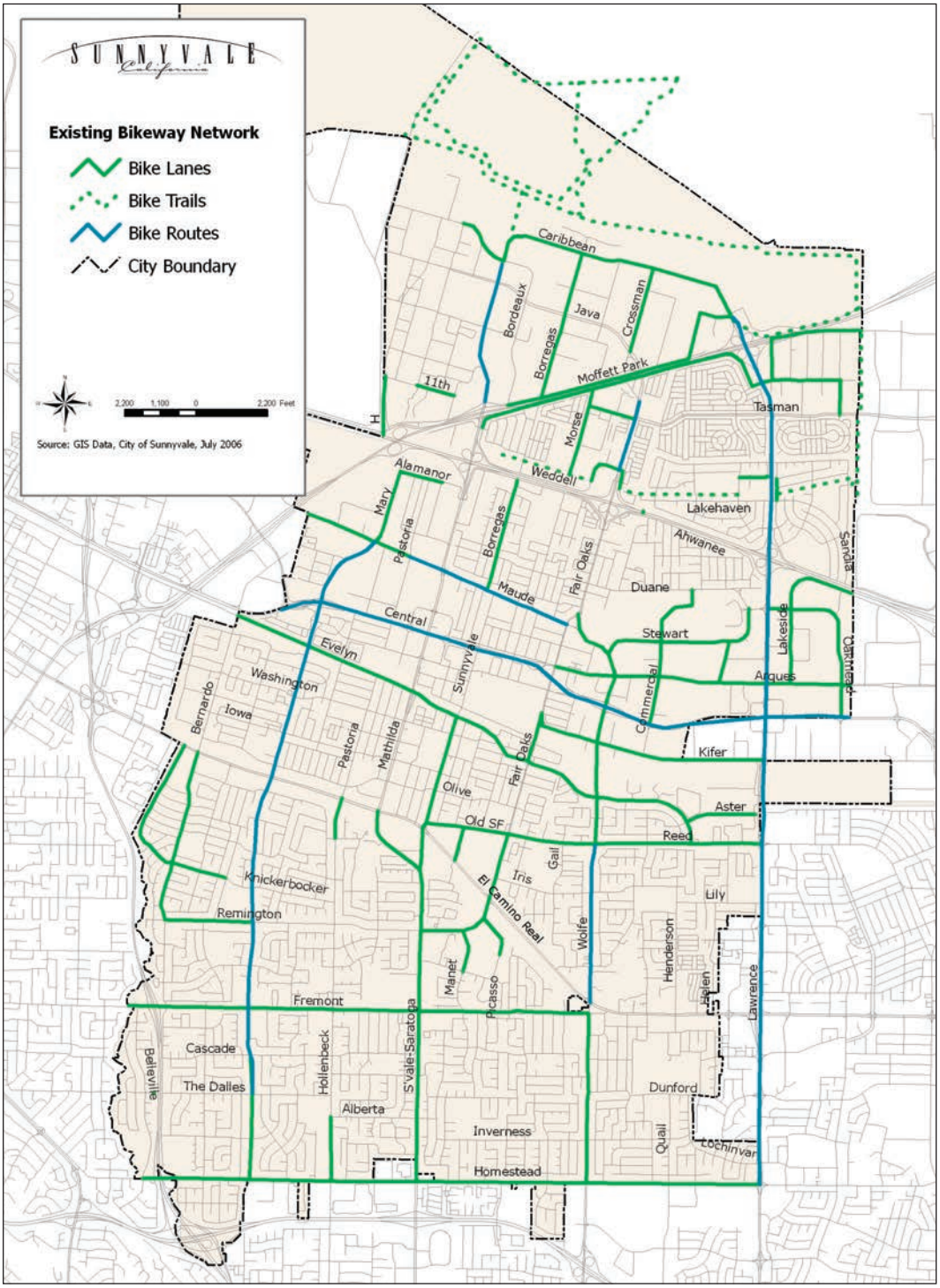
PATHS

In addition to the roadway network, bicyclists use several paved paths throughout the City. These include the John W. Christian Greenbelt on the Hetch Hetchy Aqueduct right of way north of US-101, the Calabazas Creek Trail between US-101 and Old Mountain View-Alviso Road, and the Bay Trail segment north of Highway 237 in Baylands Park. Several short path segments throughout the City connect streets to schools and to other streets.

EXISTING AND FUNDED BIKEWAY NETWORK

Figure 2.2 shows Sunnyvale's existing and funded bike lanes, routes, and paths. The City's 2005 Bicycle Map appears as Figure 2.17 on page 56.

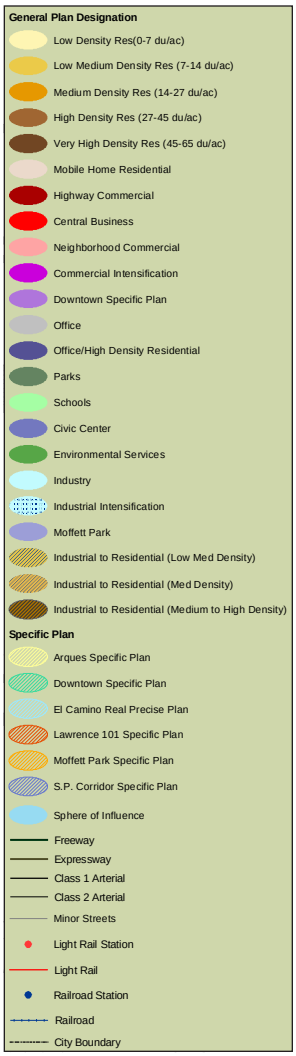
Figure 2.2
Existing bikeway network



2.2 Land Use Plans and Guidelines

OVERVIEW

Figure 2.3 shows land use designations from Sunnyvale's 1997 General Plan. The legend is enlarged at right:



Although Sunnyvale is mostly built out and envisions no changes to its single-family residential areas, land uses are changing significantly in several areas described in the following subsections:

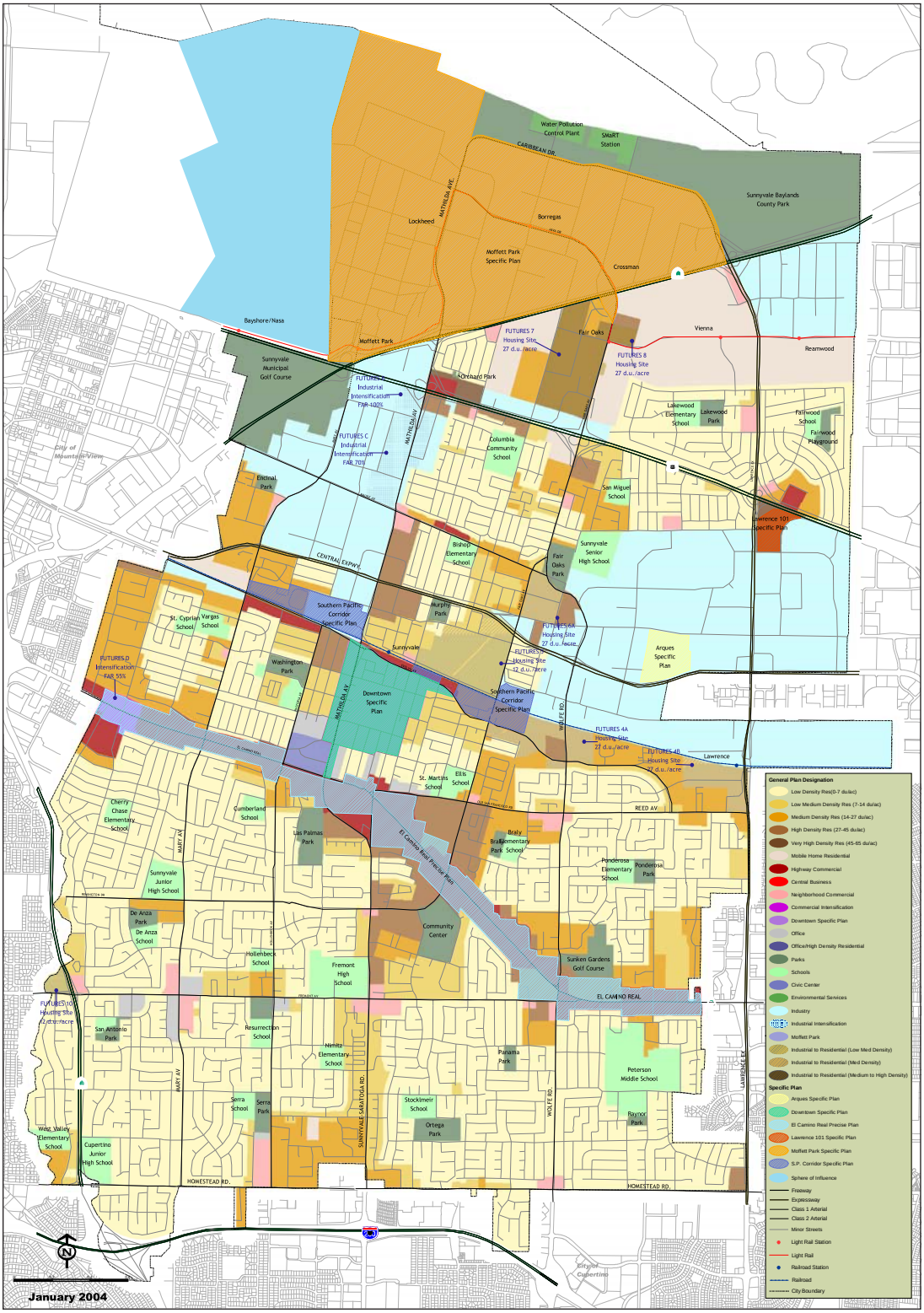
The *2001 Moffett Park Specific Plan* will guide development of the non-residential area north of Highway 237, encouraging higher densities near Light Rail stations, and providing pedestrian connectivity that is currently missing.

The *1993 Futures Study* examined potential rezoning of industrial and office sites to further the City's objectives for improved jobs/housing balance, reduced transportation congestion, and improved air quality. It identified six industrial sites for rezoning to "Industrial to Residential" (ITR), allowing medium- and high-density "infill" housing, and four sites for "industrial intensification" through increased floor area ratio.

The *Tasman/Fair Oaks Area Pedestrian and Bicycle Circulation Plan* describes nonmotorized access for Futures Housing Sites 7 and 8, two adjoining ITR zones along Fair Oaks Avenue between US-101 and Highway 237.

The *Downtown Specific Plan* is a long-range plan to guide development within the area roughly bounded by Mathilda Avenue, Evelyn Avenue, Sunnyvale Avenue, and El Camino Real, including the redevelopment of the downtown into a mixed-use grid-based urban core with several new parking structures.

Figure 2.3
1997 General Plan map



MOFFETT PARK SPECIFIC PLAN

Moffett Park is Sunnyvale's flagship office, research, and light industrial complex located north of Highway 237 east of US-101, and north of US-101 west of Highway 237. It intentionally excludes residential uses that might conflict with industrial processes and noise.

The Moffett Park Specific Plan, completed in 2002, is a comprehensive long-term plan intended to attract and retain high-value companies through high-quality development. Its MP-TOD zoning sub-district type encourages high-density development near Moffett Park's Light Rail stations. The Plan has several Objectives that support bicycling:

Table 2.1
Moffett Park Specific Plan Objectives Relevant to Bicycling

Category	Objective	Content
Circulation and Transportation	CIR-1	Strive for a net Transportation Demand Management trip reduction of 20% on all new development within the Specific Plan area. Encourage peak hour trip reduction options when feasible.
	CIR-2	Provide for improved pedestrian and bicyclist mobility within the Specific Plan area
	CIR-5	Require a correlation between higher intensity land uses in the Specific Plan project area and direct access to alternative modes of transportation.
General Environmental	ENV-1	Require that all potential environmental effects of new development be mitigated to the greatest extent feasible.
	ENV-4	Encourage future development to incorporate green building techniques into site design, building construction, and occupancy and operation of the building. ("LEED" [Leadership in Energy and Environmental Design] certification includes Alternative Transportation incentives for providing secure bicycle storage and changing facilities)

The Plan requires bicycle parking at the ratios shown in Table 2.2:

Table 2.2
Moffett Park Specific Plan Bicycle Parking Requirements
(Data from Moffett Park Specific Plan Table 5.2)

Land Use Type	Required Spaces
Office Uses	1 space/6000 SF (75% Class I, 25% Class II)
Industrial Uses	Class I/30 employees or 1500 SF
Hotels/Motels	Class I/30 rooms + Class I/30 employees
Commercial	Class I/30 employees + Class II/6000 SF
Class I: Facilities that protect the entire bicycle from theft, vandalism and inclement weather. Appropriate for long-term (two or more hours). Examples include bike lockers, rooms with key access, guarded parking areas, and valet/check-in parking.	
Class II: A bicycle rack to which the frame and at least one wheel can be secured with a user-provided U-lock or padlock and cable.	

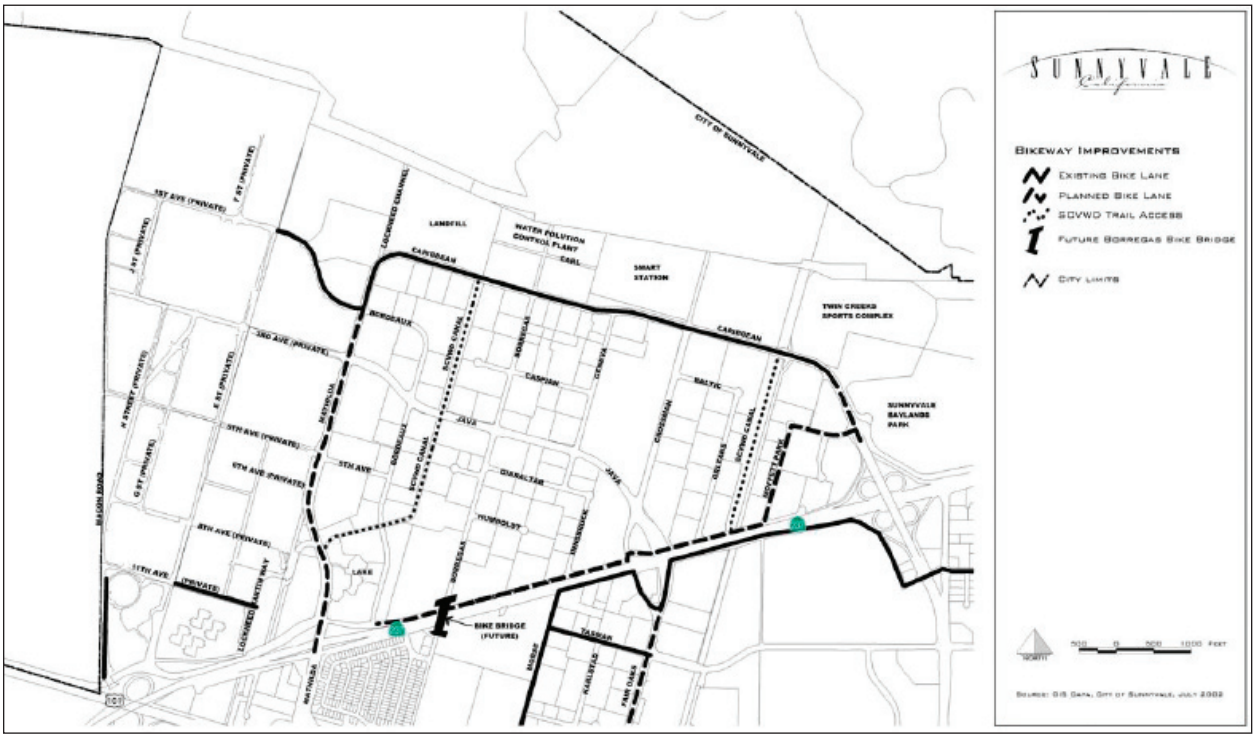
Moffett Park Specific Plan roadway improvements include the Mary Avenue Extension and a grade separation on Lawrence Expressway. The Mary Avenue Extension would span the US-101/Highway 237 interchange. The City plans to provide bike lanes on the Mary Avenue extension over US-101 and Highway 237, which will provide a much-needed alternative to Mathilda Avenue for cyclists who do not wish to detour to Ellis Street to cross US-101. In addition to substantially increasing motor vehicle volumes on Mary Avenue especially north of Central Expressway, this connection would also increase the use of existing bike lanes and bicycle routes further south on Mary Avenue. This project is in the conceptual design and environmental clearance phases, and may be constructed 7 to 15 years in the future.

The planned Borregas Avenue overcrossings of US-101 and Highway 237 will create a central bicycle access to Moffett Park that connects directly to downtown and its Caltrain station via Sunnyvale Avenue, and with the Borregas Light Rail station to the north.

The Plan's Exhibit 4-6 (Bikeway Improvements), shown below as Figure 2.4, shows planned bike lanes on Moffett Park Drive that have since been implemented. It does not show the Mary Avenue Extension or a future bike route on Borregas (other than the Borregas/Highway 237 overcrossing). This Exhibit does show two Santa Clara Valley Water District canal trails that may provide alternative off-street access to some parcels. These trails may significantly improve directness for pedestrian travel and will have recreational benefits. They may not attract significant numbers of commuter cyclists off nearby parallel streets because those streets have low motor vehicle volumes and provide acceptable "last block" connectivity to Moffett Park workplaces.

Figure 2.4

Moffett Park Specific Plan Exhibit 4-6 (Bikeway Improvements)



1993 FUTURES STUDY, 2000 FUTURES SITES SUMMARY

In 1993, the City completed a Futures Study that examined potential rezoning of industrial and office sites to further the City's objectives for improved jobs/housing balance, reduced transportation congestion, and improved air quality. The Futures Sites summary, published in November 2000, describes several sites identified in the 1993 study.

HOUSING SITES

Several industrial areas were rezoned as Industrial to Residential (ITR) Combining District, targeted for medium- and high-density housing:

- Site 4a: Evelyn Avenue between Fair Oaks Avenue and just east of Wolfe Road
- Site 4b Aster Avenue between Evelyn Avenue and Lawrence Expressway
- Site 6a Area bounded by E. Arques Avenue, Fair Oaks Avenue, Wolfe Road, and Britton Avenue
- Site 7 Area bounded by Morse Avenue, Persian Drive, Fair Oaks Way, Fair Oaks Avenue, and the John W. Christian Greenbelt
  (addressed by 2004 Tasman/Fair Oaks Area Pedestrian and Bicycle Circulation Plan)
- Site 8 North side of Tasman Drive between Fair Oaks Avenue and East Channel
  (addressed by 2004 Tasman/Fair Oaks Area Pedestrian and Bicycle Circulation Plan)

INDUSTRIAL INTENSIFICATION SITES:

Four sites were selected for intensified development of industrial, office or commercial uses by allowing increased Floor Area Ratios (FAR):

- Site B Flanking Mathilda Avenue just south of US-101 between Vaqueros Avenue and San Aleso Avenue
- Site C Area between Site B and Maude Avenue, between Vaqueros Avenue and Mathilda Avenue
- Site D Area flanking El Camino Real from just west of Knickerbocker Drive to the alignment of Carnero Avenue
- Site E Java Drive between Mathilda Avenue and Highway 237
  (Addressed by Moffett Park Specific Plan)

When developed, these sites will add bicycle trips and add or change bicycle trip types from their vicinity, such as school commutes and family recreation. For example, Housing Sites 7 and 8, described in the Tasman/Fair Oaks Area Bicycle/Pedestrian Circulation Plan (next section), will add school commute trips to Lakewood Elementary and Columbia Middle School. Industrial Intensification sites will increase demand for bicycle routes suitable for adult commuters.

TASMAN/FAIR OAKS AREA BICYCLE/PEDESTRIAN CIRCULATION PLAN

The area bounded by the John W. Christian Greenbelt alignment, Morse Avenue, Persian Drive, and the East Channel (a channelized creek parallel to and east of Fair Oaks Avenue) contains the City's "Futures Areas" 7 and 8, designated "Industrial To Residential" (ITR). Low-rise light industrial uses within this area are being replaced by Medium-Density Residential (up to 24 Dwelling Units/acre) and High-Density Residential (up to 36 DU/acre), served by the Tasman Light Rail line along Tasman Drive to the east and along Fair Oaks Avenue across Highway 237 to the north.

Morse Avenue, Persian Drive, Fair Oaks Avenue, Weddell Drive and Tasman Drive are on Sunnyvale's bicycle route network, and the JWC Greenbelt and Weddell Drive connect the ITR area to the existing Fair Oaks (Ahwanee to Lakehaven) overcrossing and the future Borregas overcrossings. Bicycle access to and through the area is ensured through the City's development review and approval process, which includes application of VTA's Bicycle Technical Guidelines.

The ***Tasman/Fair Oaks Area Pedestrian and Bicycle Circulation Plan*** specifies circulation improvements for this area based on existing City policies. It calls for:

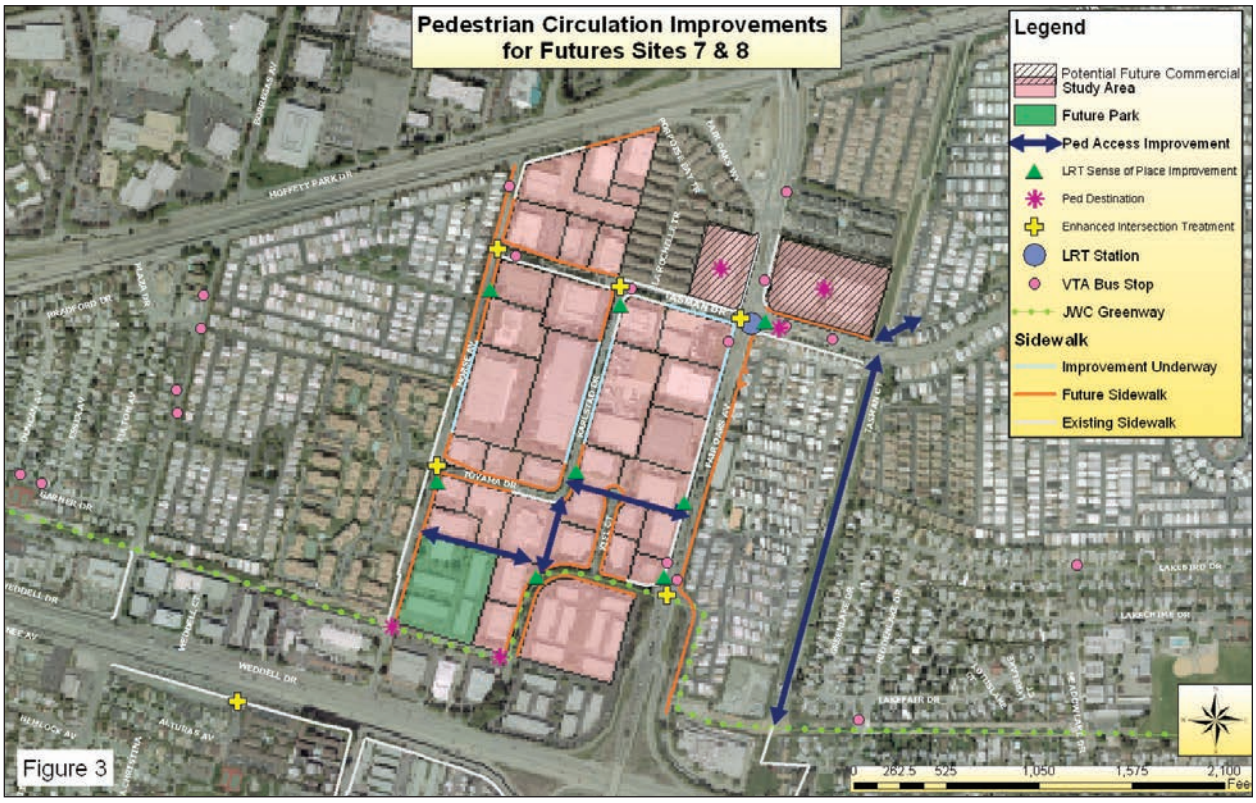
- Bikeways on all collector and arterial streets
- Bike racks at retail uses
- Bike parking in residential development
- Pedestrian access improvements to the Fair Oaks Light Rail station
- Reduced curb radius
- Enhanced intersections
- Pedestrian paths to shorten blocks

This Plan identifies pedestrian access improvements including the addition of a sidewalk to Weddell Drive between the JWC Greenbelt access points on either side of Fair Oaks Avenue, a segment that already has bike lanes.

Figure 2.5

Tasman/Fair Oaks area pedestrian circulation improvements

(Sources: Tasman/Fair Oaks Area Pedestrian and Bicycle Circulation Plan, Figure 3)

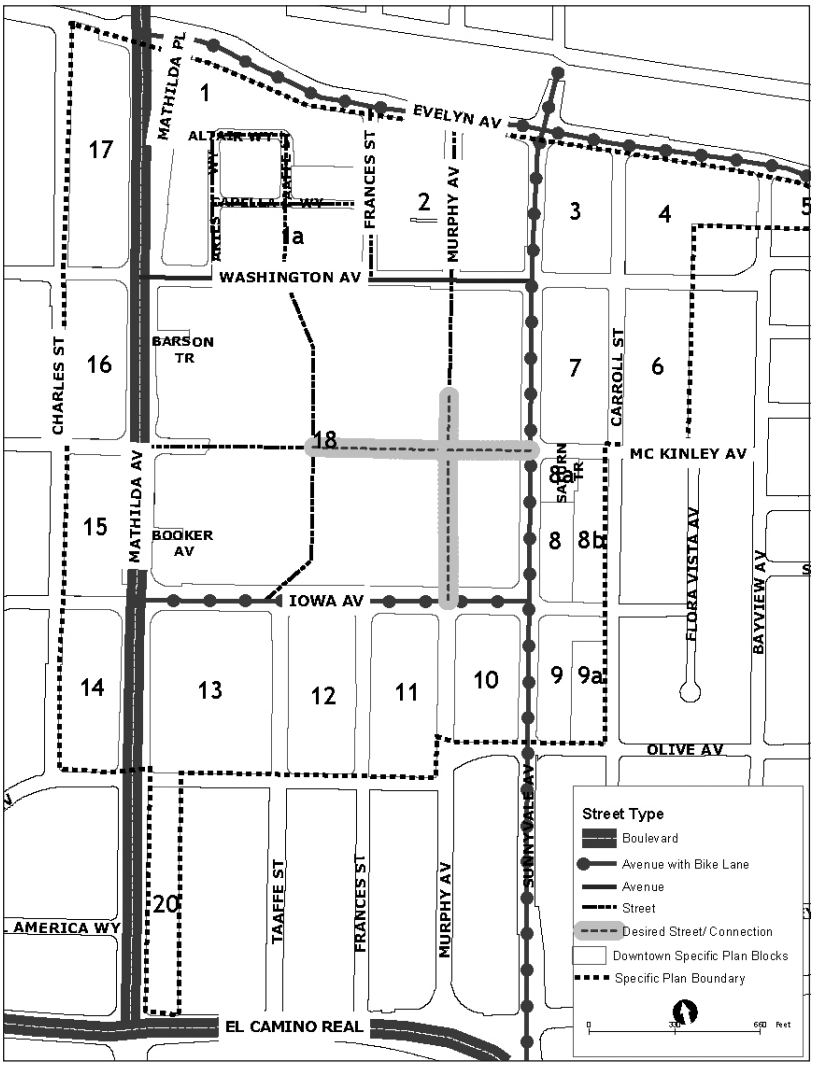


2003 DOWNTOWN SPECIFIC PLAN

The 2003 Downtown Specific Plan guides improvements within an area of approximately 125 acres as shown in Figure 2.6. Its vision is "an enhanced, traditional downtown serving the community with a variety of destinations in a pedestrian-friendly environment." It calls for increasing the number of residential units, reconnecting the street grid in the commercial core, and providing wider sidewalks and taller buildings along Mathilda Avenue to create a "sense of arrival".

The Plan's goals and policies include bicycle and pedestrian linkages, multimodal access, and use of VTA's bicycle parking standards wherever possible. It encourages reconnection of Murphy Avenue, Taaffe Street, and McKinley Avenue through the core, and the provision of bike lanes on Sunnyvale, Evelyn, and Iowa Avenues (Figure 2.6). It envisions three transition districts of multifamily housing and service retail to buffer adjacent single-family residential areas.

Figure 2.6
Downtown Specific Plan Street Character
(2003 Downtown Specific Plan, Figure 7.1)



2.3 Bicycle Commuting

Bicycle commuting, also known as "utility" cycling, includes trips to work, school, shopping and appointments. In the Bay Area, many workplace commutes also involve bicycling to transit and/or bringing a bicycle aboard transit vehicles. This section describes adult "journey to work" bicycle trips, bicycling to Sunnyvale public schools, and the transit options and facilities available to cyclists. It also projects the amount of increase in bicycle commuting expected to result from facility improvements.

2000 U.S. CENSUS

The Association of Bay Area Governments provides a summary of U.S. Census 2000 data for each Bay Area city. Sunnyvale's bicycle mode share of adult journey-to-work trips in 2000 was under 1%, generally typical for cities in Santa Clara County. Because the Census commute data is single-mode, bike-to-transit and bike-on-transit trips discussed in Section 2.4 would be counted as public transportation trips. This data does not count bicycle commutes by students to schools, summarized later in this section.

Table 2.3

US Census 2000 commute data for Sunnyvale

ALL MODES (Sunnyvale residents only)		
Commute mode	**Count**	**Share**
Car, truck, or van:	64,975	90.6%
Drive alone	57,492	80.1%
Carpool	7,483	10.4%
Public Transportation	2,702	3.8%
Bus or trolley bus	1,865	2.6%
Streetcar or trolley car	25	0.0%
Subway or elevated	42	0.1%
Railroad	735	1.0%
Ferryboat	0	0.0%
Taxicab	35	0.0%
Motorcycle	268	0.4%
Bicycle	**526**	**0.7%**
Walked	1,106	1.5%
Worked at home	1,878	2.6%
Other means	281	0.4%
Total	**71,736**	**100.0%**

BICYCLE COMMUTING (all)				
Intra-city (Sunnyvale to Sunnyvale)			**225**	
Inbound from...		**Outbound to...**		
San Jose	110	Santa Clara	90	
Santa Clara	80	Mountain View	60	
Mountain View	75	Cupertino	45	
Palo Alto	35	Palo Alto	40	
Cupertino	25	Milpitas	20	
Campbell	10	Stanford	20	
Gilroy	10	San Jose	15	
Burbank*	4	Loyola**	4	
Menlo Park	4			
Redwood City	4			
Other SC County	15			
Other SM County	4			
Inbound	**376**	**Outbound**	**294**	**33%**
		Inbound	**376**	**42%**
		Intra-city	**225**	**25%**
		Total	**895**	**100%**

Source: US Census 2000, Census Transportation Planning Package

SC Co = Santa Clara County, SM Co = San Mateo County

** Burbank is a Census-designated unincorporated area near the I-880/I-280 interchange (Valley Fair Mall/ Santana Row vicinity).*

*** Loyola (Loyola Corners) is a Census-designated unincorporated area near the Foothill Expressway/Loyola Driver interchange.*

The minor discrepancy between the 526 resident bicycle commuters shown under Commute Mode and the 519 obtained by adding Outbound and Intra-city is unexplained.

2005 MOFFETT PARK EMPLOYEE SURVEY (ADULT WORKERS)

The Moffett Park Business and Transportation Association (MPBTA) is a collaboration between the City and employers in the Moffett Park area north of Highway 237. In late 2005, MPBTA conducted a voluntary employee commute survey of eight Moffett Park companies (Ariba, Interwoven, Juniper, Labcyte, Marvell, Motorola, Network Appliance and Yahoo) plus City employees throughout Sunnyvale, for the two-week period October 24 – November 4.

The total estimated employment of the companies surveyed plus the City was 10,629. Over 4,600 responses were received - a 43% response rate. 94.1% of respondents said they work a five-day workweek. 1.5% said they bicycled to work, and an additional 0.8% combined a bicycle with transit. It is worth noting that the survey was conducted in late October, after the end of Daylight Savings Time and the start of the usual rainy season. By comparison, Sunnyvale's Census 2000 bike commute percentage was 0.7%.

Table 2.4
Moffett Park 2005 survey: Commute Mode, 5-day average

Mode	Count	Share
Drive Alone	3,071	66.6%
Carpool	510	11.0%
Public transit	363	7.9%
Telecommuting	177	3.8%
Employer-provided shuttle	100	2.2%
Bicycle	**67**	**1.5%**
Electric/Hybrid	63	1.4%
Motorcycle/Moped	61	1.3%
No response	58	1.2%
Public transit in combination with bicycle	**37**	**0.8%**
Traveling for business	31	0.7%
Other day off (vacation, sick)	26	0.6%
Regular Day Off (compressed week)	18	0.4%
Walk	13	0.3%
Reported to another worksite	10	0.2%
Vanpool (7+ people)	7	0.1%
Total	**4,612**	**100.0%**

Table 2.5
Moffett Park 2005 survey: Commute Distance (all modes)

Distance	Count	Share
0.0 - 0.9 miles	44	1.0%
1.0 - 2.9 miles	151	3.3%
3.0 - 4.9 miles	341	7.4%
5.0 - 9.9 miles	932	20.2%
10.0 - 14.9 miles	801	17.4%
15.0 miles or more	2,343	50.8%
No answer	117	2.5%
Total	**4,612**	**100.0%**

74.3% of drive-alone respondents said they would consider using an alternative mode on an occasional basis. Of 24 possible ways that might encourage them, "safe, convenient bike paths and routes" ranked #7; improved workplace bike facilities such as showers and bike lockers ranked last. Telecommuting and "emergency ride home" ranked #1 and #2 respectively.

One survey question asked for additional comments. Common concerns of those who already bike to work, or would like to, were:

- "Unsafe [bikeways] require an experienced bicyclist"
- "Traffic is too fast and drivers ignore the safety of bicyclists"
- "[Bikeways] are not connected between cities and are not maintained"

Based on the results of this survey, it appears likely that the addition of the Borregas Avenue bicycle/pedestrian bridges over US-101 and Highway 237 will encourage many more Moffett Park workers to try bicycling to work.

PROJECTED INCREASE IN BICYCLE COMMUTING

It is expected that the bikeway network additions and enhancements described in this Plan will significantly increase the use of bicycles for utility transportation and recreation. Among the improvements anticipated during this Plan's time horizon are closures of four key gaps affecting home-to-work trips:

- The Borregas Avenue bicycle-pedestrian bridges over US-101 and Highway 237, expected to open in 2009, will connect Moffett Park workplaces and the Sunnyvale Baylands recreational area with the residential southern areas of the City, and will provide a direct connection to Caltrain via Sunnyvale Avenue. They will create the first north-south route into Moffett Park with the directness, comfort, and safety desired by many potential bicycle commuters, including those who responded to the 2005 survey by the Moffett Park Business and Transportation Association (MPBTA) as described in the following section.
- The Mary Avenue bicycle-pedestrian bridge across I-280, a Cupertino project expected to be opened on December 31, 2008, will connect Sunnyvale residents north of I-280 with Cupertino destinations such as De Anza College and the office parks along Bubb Road. It should produce a substantial increase in bicycle commute trips because the existing route to the west traverses the Foothill Expressway/I-280 interchange and involves substantial descending and climbing.

- The Bernardo Avenue bicycle-pedestrian undercrossing of the Caltrain line, combined with Bernardo's existing signal on Central Expressway, will connect nearby Mountain View workplaces to residences south of the railroad. It would reduce bicycle commute distances to NASA's Ames Research Center via the Ellis St./US-101 interchange. This undercrossing is programmed in the Bicycle Expenditure Plan for 2016 and is in the City's budget.
- The Mary Avenue Extension over US-101 and Highway 237 to the 11th Avenue area near Lockheed would further connect Moffett Park with Sunnyvale residences, complementing the Borregas Avenue bridges to the east. This project is in the conceptual engineering and environmental clearance phase. It is not fully funded, and may be built within seven to 15 years.
- The Calabazas Creek undercrossing of Tasman Drive will connect cyclists from residences south of Tasman Drive to workplaces on the north side without having to ride on Lawrence Expressway. This undercrossing is envisioned to be available during low-water conditions (dry season, and non-storm periods during the rainy season).

The addition of the Borregas Avenue and Mary Avenue bicycle-pedestrian bridges will provide direct and pleasant routes for many bicycle commute trips. Completion of the City's entire bikeway network as defined in the Bicycle Capital Improvement Program will substantially improve directness and bicyclist comfort levels on key arterial roadway segments especially in the north-south direction. Together these enhancements are expected to double commuting within, into, and out of Sunnyvale to approximately 1,800 daily round-trips from the current total of approximately 900 (US Census 2000).

These figures omit bike-on-transit trips, which the U.S. Census counts as transit trips. Bike-on-train trips via Sunnyvale's downtown Caltrain station are expected to increase substantially when the Borregas Avenue bridges and bike lanes on Evelyn Avenue are completed. This will substantially increase the number of commuters who leave home and arrive at work by bicycle.

BICYCLING TO SCHOOLS

Existing bike-to-school activity was estimated for public schools in Sunnyvale, and the on- and off-street routes available for students to bike to each school were inventoried. The location and quality of each school's bicycle parking area was noted, along with its proximity and accessibility from student bicycle commute routes. School and district staff provided low-to-high ranges of the numbers of students who bicycle on favorable days.

By age 10, most children can safely bicycle to school on their own using low-volume neighborhood streets, though many younger children bicycle with their parents. Accordingly, Grades K-2 were omitted from the bicycling rate calculations. Students bused to school were also omitted because it was assumed that they do not live within reasonable bicycling distance.

SUNNYVALE'S BIKE-TO-SCHOOL ENVIRONMENT

Public schools in Sunnyvale report a wide range of student bicycle commute rates. Several factors influence the convenience of bicycling to school, by itself and as a choice relative to other modes such as walking. Almost all Sunnyvale neighborhoods have excellent sidewalk networks and many residences are within a 10-minute walk of their elementary school, so many elementary school students walk to school.

Although crossings of collector and arterial streets can be difficult for student cyclists, many such crossings in Sunnyvale are controlled by a crossing guard during school commute periods. This effectively connects bike-to-school routes across those streets.

Many students are driven to school by a parent or guardian, including most of those who live at a considerable distance or beyond a major street or highway barrier. Few elementary school students are bused in Sunnyvale unless they:

- Live a considerable distance from school.

  (For example, Ellis Elementary only allows busing for students living 1.25 miles or further away. Fremont High School has a subscription busing program.)

- Live beyond a major barrier such as a freeway

  (one example is Lakewood Elementary's attendance area south of US-101)

- Are Special Education students

SUMMARY OF SUNNYVALE PUBLIC SCHOOL STUDENT BICYCLE COMMUTING

Figure 2.7 summarizes student bicycle commute activity for all public elementary, middle, and high schools in Sunnyvale, as estimated by school staff and school district administrators. Enrollment data is a one-day snapshot from March 6, 2006.

The results indicate that an average of between 5% and 6.5% of all students eligible to bicycle (Grades 3 and up, and not bused) do so on favorable days. However, the estimated rate varies considerably between schools, from under 2% to over 20%. Four elementary schools - Cherry Chase, Ponderosa, Stocklmeir, and West Valley - have rates of 10% or higher; at Stocklmeir about one in five eligible students arrive by bike. The wide variation may be attributable to home-to-school distance distributions, bicycle route connectivity, the cost of bicycles for low-income families (cited by one school's staff), student age (older teens are presumably more focused on car ownership, and may drive to jobs), and possibly by varying levels of encouragement for bicycling.

Figure 2.7
School Bicycle Commute Data (Spring 2006)

SCHOOL DISTRICTS with schools in Sunnyvale

Name	Abbr	ES	MS	HS	Bike To School policy
Cupertino Union School District	CUSD	3	1	0	Grade 3 and up unless accompanied by adult
Fremont Union High School District	FUHSD	0	0	1	No restrictions
Santa Clara Unified School District	SCUSD	2	1	0	No restrictions
Sunnyvale School District	SSD	8	2	0	Grade 3 and up
		13	4	1	

KEY
ES = Elementary School
MS = Middle School
HS = High School
K = Kindergarten

SCHOOLS

ELEMENTARY

	District	K	1	2	3	4	5	Total	Bused	3-4-5 Total	3-4-5 Bused	Total OK to bike	Bike To School Low Est.	Bike To School High Est.	Bike% Low	Bike% High
Bishop	SSD	100	100	118	97	116	95	626		308		308	10	20	3.2%	6.5%
Braly	SCUSD	57	50	62	49	51	30	299	65	130	20	110	5	10	4.5%	9.1%
Cherry Chase	SSD	116	100	80	79	76	63	514		218		218	20	20	9.2%	9.2%
Cumberland	SSD	99	80	97	72	78	74	500	25	224	15	209	25	35	12.0%	16.7%
Ellis	SSD	99	95	98	98	94	81	565		273		273			0.0%	0.0%
Fairwood	SSD	59	51	53	37	45	48	293		130		130	0	0	0.0%	0.0%
Lakewood	SSD	80	80	72	80	99	92	503		271		271	5	5	1.8%	1.8%
Nimitz	CUSD	85	69	113	93	101	89	550	34	283	0	283	10	20	3.5%	7.1%
Ponderosa	SCUSD	76	90	99	72	75	71	483	0	218	0	218	25	30	11.5%	13.8%
San Miguel	SSD	78	75	60	77	81	64	435		222		222	2	5	0.9%	2.3%
Stocklmeir	CUSD	148	109	120	110	110	109	706	0	329	0	329	60	75	18.2%	22.8%
Vargas	SSD	101	92	91	98	82	87	551	30	267	15	252	10	20	4.0%	7.9%
West Valley	CUSD	89	89	87	100	102	128	595	0	330	0	330	30	40	9.1%	12.1%
		1187	1080	1150	1062	1110	1031	6642	154	3203	50	3153	202	280	6.4%	8.9%

MIDDLE

	District				6	7	8	Total	Bused			Total OK to bike	Bike To School Low Est.	Bike To School High Est.	Bike% Low	Bike% High
Columbia	SSD				261	319	277	857				857	30	50	3.5%	5.8%
Cupertino	CUSD				370	378	418	1166	15			1151	100	100	8.7%	8.7%
Peterson	SCUSD							996	350			646	30	50	4.6%	7.7%
Sunnyvale	SSD				303	311	329	943				943	40	40	4.2%	4.2%
					934	1008	1024	3962	365			3597	200	240	5.6%	6.7%

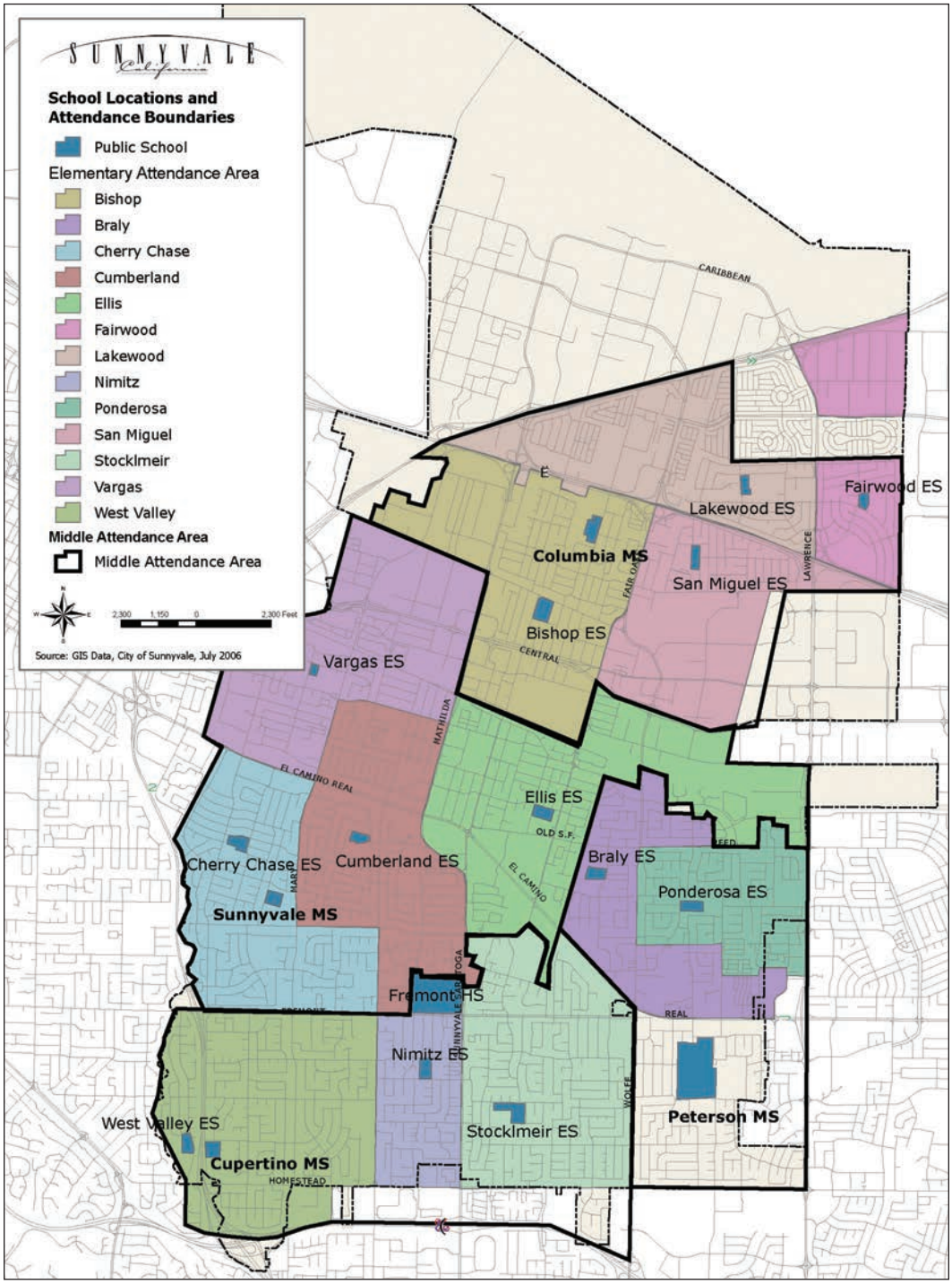
HIGH

	District			9	10	11	12	Total	Bused			Total OK to bike	Bike To School Low Est.	Bike To School High Est.	Bike% Low	Bike% High
Fremont	FUHSD			486	446	522	402	1856	554			1302	25	35	1.9%	2.7%
Homestead	FUHSD			567	589	504	429	2089								
				1053	1035	1026	831	3945	554			1302	25	35	1.9%	2.7%
								14549	1073			8052	427	555	5.3%	6.9%

NOTES
1 Enrollment excludes Special Education students
2 Calculations assume all bused students are outside bicycling range.

Figures 2.8 shows all school locations and the attendance boundaries of public elementary schools in Sunnyvale. Appendix G contains maps and details of bike to school conditions for each public elementary, middle, and high school in the City.

Figure 2.8
School Locations and Attendance Boundaries



2.4 Bicycling and Transit

The Bay Area is a national leader in the integration of bicycles and transit. Almost all transit systems in the region accommodate bicycles aboard, and some systems such as Caltrain provide relatively high on-board bicycle capacity.

Sunnyvale is situated at the southern end of the San Francisco Peninsula, whose relatively narrow developed area has concentrated development along the historic rail corridor now used by the Caltrain commuter rail line. Sunnyvale is served by Caltrain and by VTA's Light Rail line, transit buses, and shuttle buses serving the Great America commuter rail station at Tasman Drive and Lafayette Street. That station is the northernmost stop in Santa Clara County for Altamont Commuter Express (ACE) trains serving southern Alameda County and the Central Valley, and for Capitol Corridor trains serving the East Bay and I-80 corridor to Sacramento.

CALTRAIN

Sunnyvale has two Caltrain stations: Sunnyvale (downtown) and Lawrence. The downtown station is located on Evelyn Avenue between Mathilda Avenue and Frances Street, with a parking garage on site and a major bus transfer station on Frances and Evelyn. The Lawrence Station is located under Lawrence Expressway, with access to Kifer Road, Reed Avenue, Evelyn Avenue (via Aster Avenue) and Martin Avenue. Some bike-and-train commuters to Moffett Park workplaces use the Mountain View Caltrain station, crossing under US-101 via the Ellis Street interchange and using Manila Drive and Moffett Park Drive to reach Sunnyvale.

RIDERSHIP

In Caltrain's 96-weekday-train schedule dated January 1, 2006, the two stations are served by 62 and 60 weekday trains respectively. Based on February 2006 average weekday boardings the two stations ranked #8 and #17 respectively among Caltrain's 34 stations. The downtown station has 4.2% of all Caltrain boardings and is the fourth busiest in Santa Clara County after Palo Alto, Mountain View, and downtown San Jose, which are all major express train ("Baby Bullet") stops.

Below are annual weekday average boardings from the start of service in 1992, and weekday average total and bicyclist on/off data since 2000 except for 2002 bicyclist data. Data from 1992 to 2001 reflects the addition of more weekday trains. The area experienced an economic downturn in 2002 and 2003. Data for 2004 and later reflects the shift to a limited-stop-based timetable favoring busier stations, following track and signal upgrades to enable trains to pass each other. In 2006, the downtown station had a substantial increase in total boardings and a smaller but significant increase in bicyclist boardings.

Table 2.6
Caltrain average weekday boardings since start of Caltrain service

Station	Oct 92	Oct 93	Mar 94	Feb 95	Mar 96	Feb 97	Feb 98	Feb 99	Feb 00	Feb 01	Feb 02	Feb 03	Feb 04	Feb 05	Feb 06
Sunnyvale	814	883	872	828	1001	1204	1214	1230	1363	1427	1222	1020	1149	970	1342
Lawrence	601	601	575	558	687	822	965	981	1124	1309	956	773	593	534	514

Source: San Mateo County Transit District (Samtrans), April 2006

Table 2.7
Caltrain average weekday on/offs including bicyclists, 2000-2006

	2000		2001		2002*		2003		2004		2005		2006	
Station	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On	Off
Sunnyvale	1363	1390	1427	1414	1222	1178	1020	1011	1149	1163	970	960	1342	1333
Bicyclists	72	72	82	77	Data incorrect		65	63	82	92	80	80	93	88
%Bicyclists	5.3%	5.2%	5.7%	5.4%	Data incorrect		6.4%	6.2%	7.1%	7.9%	8.2%	8.3%	6.9%	6.6%
Lawrence	1124	1143	1309	1300	956	956	773	753	593	615	534	561	514	535
Bicyclists	67	66	70	72	Data incorrect		52	49	46	44	47	43	48	47
%Bicyclists	6.0%	5.8%	5.3%	5.5%	Data incorrect		6.7%	6.5%	7.8%	7.2%	8.8%	7.7%	9.3%	8.8%

Source: San Mateo County Transit District (Samtrans), April 2006

Caltrain's most recent counts show 2,271 average weekday bicycle boardings (all stations).

The increase in bicyclists as a percentage of total boardings from 2003 to 2005 is significant, and is probably attributable to the introduction in 2003 of "Baby Bullet" express trains that reduce travel time to San Francisco to 49 minutes with only 3 stops midway, making a bike-train-bike commute very competitive with freeway driving. The current (October 2005) timetable provides three hourly AM expresses from Sunnyvale to San Francisco, and three hourly PM express returns. In contrast, the "reverse commute" (AM southbound, PM northbound) takes about 60 minutes each way. This is because no reverse-commute expresses serve Sunnyvale, only "limited-stop" trains that skip most stops on half of the Peninsula but make all stops in Santa Clara County.

Figure 2.9
Boarding old-style Caltrain bike car at Sunnyvale station

BICYCLE ACCESS

On Board

All Caltrain trains have dedicated on-board bicycle storage space. Most trains use cab and gallery cars that have been in service since the three counties purchased the line in 1992. On these trains all cab cars are bike cars and have 32 bike spaces (eight four-bike racks) occupying over half of the main level in one half of the car. Each such train has one bike car (32-bike capacity) and sometimes two (64-bike capacity).

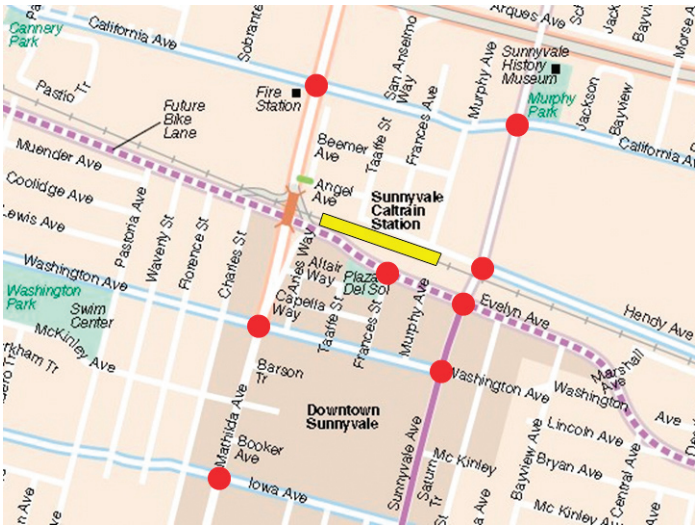
"Baby Bullet" railcars added in 2003, made by Bombardier, have a "tri-level" layout with long lower and upper seating levels spanning the car's length between the wheels and short "mezzanine" levels at each end, linked to the lower and upper levels by half-stairways. Bike cars of this type accommodate only 16 bicycles. All trains using Bombardier cars have at least one bike car (16-bike capacity) and some have two (32-bike capacity).

Downtown ("Sunnyvale") station

The downtown ("Sunnyvale") station is well connected for bicycle feeder trips. The platform and station area can be accessed from Evelyn Avenue at both Frances Street and Mathilda Place, and via an informal access point on Hendy Avenue at Frances Street. The station currently has two tracks with at-grade pedestrian crossings between the north and south platforms. In the north-south direction, Sunnyvale Avenue is a nearby parallel alternative to busy Mathilda Avenue. South of Evelyn Avenue, Sunnyvale Avenue has bike lanes that cross El Camino, connecting Caltrain cyclists to the southern half of Sunnyvale's bikeway network and to Cupertino via Sunnyvale-Saratoga Road. In the east-west direction, just north of the Caltrain line, Hendy Avenue connects east to Fair Oaks Avenue, and California Avenue connects to nearby workplaces west of Mathilda, and to Mary Avenue workplaces beyond. South of the Caltrain line, bike lanes are funded on the full length of Evelyn Avenue, connecting to existing bike lanes in Mountain View to that city's downtown. An alternative "neighborhood" route to Mountain View uses Washington Avenue and Dana Street.

Connections to this station will improve due to planned bicycle route network improvements and changes to the downtown circulation. Caltrain, in coordination with the City and VTA, plans to provide an ADA-compliant path to the north platform from the intersection of Hendy Avenue and Frances Street, replacing the existing unimproved access. The addition of the Borregas Avenue bicycle-pedestrian bridges over US-101 and Highway 237 is expected to substantially increase bicycle use of Sunnyvale Avenue and bicycle trips and bike-on-Caltrain activity associated with the station. The station's planned future configuration will have four tracks and a pedestrian undercrossing – features already present at the Lawrence station. An undercrossing is preferable to an overcrossing because of Caltrain's 27-foot vertical clearance requirement.

Figure 2.10
Sunnyvale (Downtown) Caltrain station context
Red dots indicate traffic signals



BICYCLE ACCESS

Evelyn Avenue (E-W)
Shared Roadway,
future Bike Lanes

Hendy Avenue (E-W)
Shared Roadway

Washington Avenue (E-W)
Shared Roadway
(beginner) to west

Sunnyvale Avenue (N-S)
Bike Lanes to south
Shared Roadway (intermediate)
to north

California Avenue (E-W)
Shared Roadway (beginner)

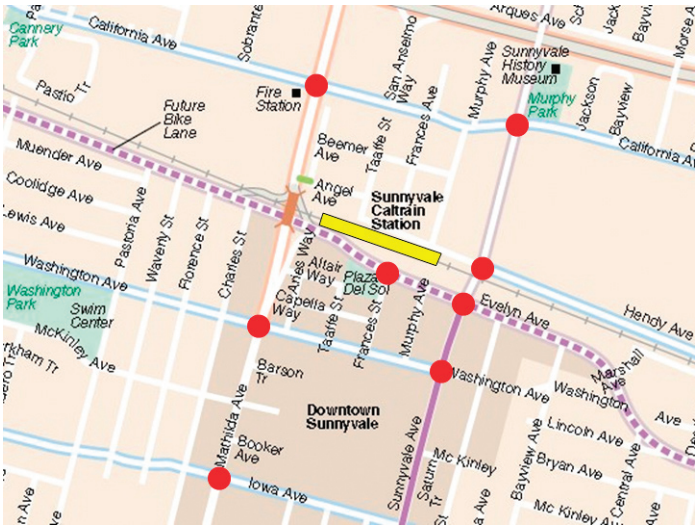
Lawrence station

The Lawrence Caltrain station is also fairly well connected for commuter bicycling and is close to many tech workplaces. The recent reconstruction of the station has made it possible to walk a bicycle between the south and north platforms via a tunnel. The north platform is connected to Kifer Road by San Zeno Way on the west side of Lawrence Expressway, and by Lawrence Station Road on the east side. The south platform is connected to Reed Avenue by Willow Avenue, to Evelyn Avenue via Aster Avenue, and to Monroe Street by French Street.

In the north-south direction, Lawrence Expressway has fairly narrow striped shoulders, high traffic volumes, and frequent commercial driveway interactions north of Kifer Road. Because there is no crossing of Central Expressway between Lawrence and Wolfe Road, reaching workplaces in the Arques Avenue/Stewart Drive complex west of Lawrence requires either riding on Lawrence or detouring via Wolfe, which has bike lanes north of Reed Avenue. In contrast, the Oakmead Parkway employment center can be reached via Kifer and Corvin Drive. These circulation conditions in the station's northwest quadrant are a significant obstacle to bicycle access.

In the east-west direction, Kifer Road provides a comfortable route north of the Caltrain line, with bike lanes west of Lawrence (within Sunnyvale) and wide outside lanes east of Lawrence (within Santa Clara). South of the Caltrain line, there are bike lanes on Reed Avenue, Willow Avenue, and Aster Avenue to the west and a bike route on Monroe Avenue to the east.

Figure 2.11
Lawrence Caltrain station context
Red dots indicate traffic signals



BICYCLE ACCESS

Lawrence Expwy (N-S)
Striped shoulders,
High volumes of fast traffic

Kifer Road (E-W)
Bike Lanes west of Lawrence,
wide outside lanes east of
Lawrence (City of Santa Clara)

Reed Avenue (E-W)
Bike lanes west of Lawrence

Monroe Avenue (E-W)
"Intermediate bike route"
east of Lawrence
(City of Santa Clara)

Trips from the north platform to eastbound Kifer signal use Lawrence Station Road, but there is no westbound left turn into Lawrence Station Road so most cyclists turn left at the Costco signal just east of Gordon Avenue and proceed south and then west through the Costco parking lot onto Lawrence Station Road.

END-OF-TRIP FACILITIES

Both Caltrain stations have bike lockers available for monthly rental. The Sunnyvale (Downtown) station also has day-use lockers that accept user-provided padlocks, but misuse of these units by homeless persons has been an issue and they are currently removed from service. To address this issue, the City plans to install day-use lockers with electronic locks operated by cards or fobs assigned to users.

Table 2.8
Caltrain station bike locker rental activity

Caltrain Station	Ridership	Bike Spaces	Rented	Rented %	Available
Sunnyvale	1,342	76	24	31.6%	52
Lawrence	514	43	18	41.9%	27
Total	**1,856**	**119**	**42**	**35.3%**	**79**

Source: San Mateo County Transit District (Samtrans), February 2006

Demand for bicycle lockers at Sunnyvale's two Caltrain stations increase with the availability of bicycle storage at other stations. For example, the Palo Alto Bikestation, an attended bicycle storage facility, has been closed for station improvements for over a year but is scheduled to reopen in mid-2006. Another attended bike station is currently being constructed at the main San Francisco station at Fourth and Townsend Streets. When these facilities are open, some bicyclists may choose to avoid on-board bicycle capacity limitations and bike car congestion by opting for a "two-bike" commute solution, storing one bicycle in San Francisco or Palo Alto and another in a locker in Sunnyvale. Caltrain periodically promotes this option in order to better utilize onboard bicycle space.

VTA LIGHT RAIL

RIDERSHIP AND END-OF-TRIP FACILITIES

VTA's Tasman West light rail line has seven stations in Sunnyvale. Figure 2.12 shows their locations in the context of the City's bikeway network.

Table 2.9 summarizes ridership and bicycle locker usage by station. VTA charges no rent for its bicycle lockers. A $25 deposit covers re-keying if a key is lost.

ON-BOARD ACCESS

Each Light Rail car can accommodate eight bicycles, four in vertical hanging racks and four more held by standing cyclists in the articulated area of the cars. Peak-period trains through Sunnyvale typically have two cars (16 bicycles capacity) and run every 15 minutes. Off-peak trains run every 30 minutes and have one car (eight bicycles capacity).

Figure 2.12
VTA Light Rail station access from Sunnyvale bikeway network

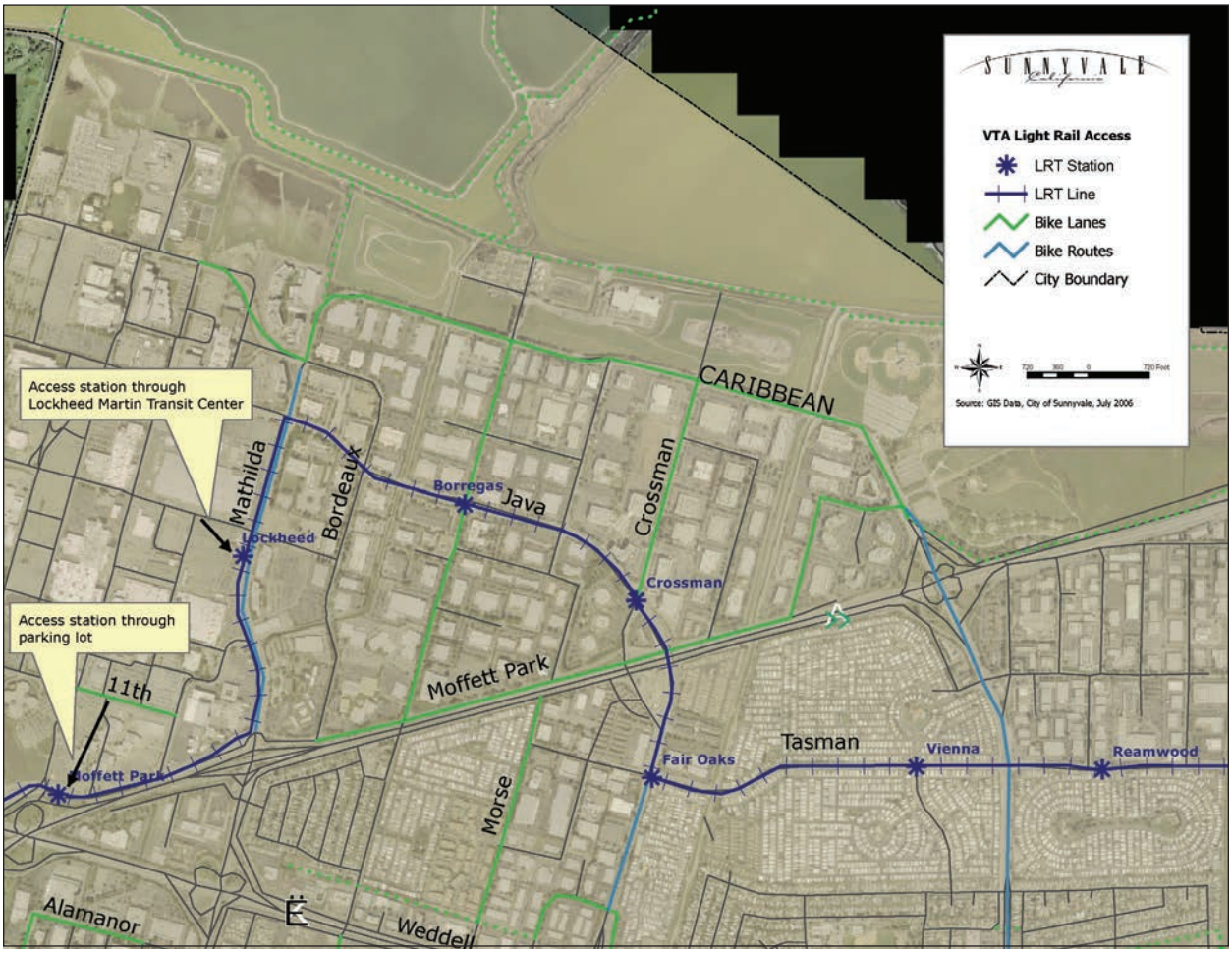


Table 2.9
Sunnyvale Light Rail station ridership and bicycle locker usage

Light Rail Station	Ridership	VTA Bike Spaces	Rented	Rented %	Available
Moffett Park	42	0	0		0
Lockheed Martin	164	16	16	100%	0
Borregas	55	0			
Crossman	33	0			
Fair Oaks	226	12	12	100%	0
Vienna	91	0			
Reamwood	82	0			
Total	**693**	**30**	**30**	**100%**	**0**

Ridership source: VTA Bicycle Program, April 2006 (all passengers, not only those with bicycles)
Ridership data: Average weekday total boardings and alightings, July-December 2005
File: FY 2006 LR AVG WEEKDAY RIDERSHIP BY STN.xls
Bicycle locker data: VTA, February 2006.

Although VTA has no bicycle lockers at the Moffett Park station, the adjacent office complex provides 36 bicycle locker spaces for its employees who commute by bicycle (not in combination with Light Rail).

Ridership of the Fair Oaks station is expected to increase as multifamily housing replaces light industrial buildings in the adjacent Tasman-Fair Oaks "Industrial To Residential" area.

VTA does not count bicyclist boardings by station, but Light Rail operators conduct annual system-wide one-day counts. Table 2.10 shows the results for 2004 and 2005.

Table 2.10

VTA Light Rail system-wide bicycle boardings

	AM Non-Peak	AM Peak	Midday	PM Peak	PM Non-Peak	Totals	% Change from previous year
	12am – 6am	6am – 9am	9am – 3pm	3pm – 6pm	6pm – 12am		
2004	33	179	218	234	156	820	+17.4%
2005	**67**	**253**	**320**	**245**	**222**	**1,107**	**+35%**
2005 % of Total	6.1%	22.9%	28.9%	22.1%	20.0%		

Source: VTA Bicycle Program Coordinator, April 2006.
Data: One-day on-board tally by operators. 2005 date: October 12
File: LR BIKE_SURVEY05-1.doc

STATION ACCESS

The following tables describe the area served by each Light Rail station in Sunnyvale, and planned bikeway network additions that would improve access.

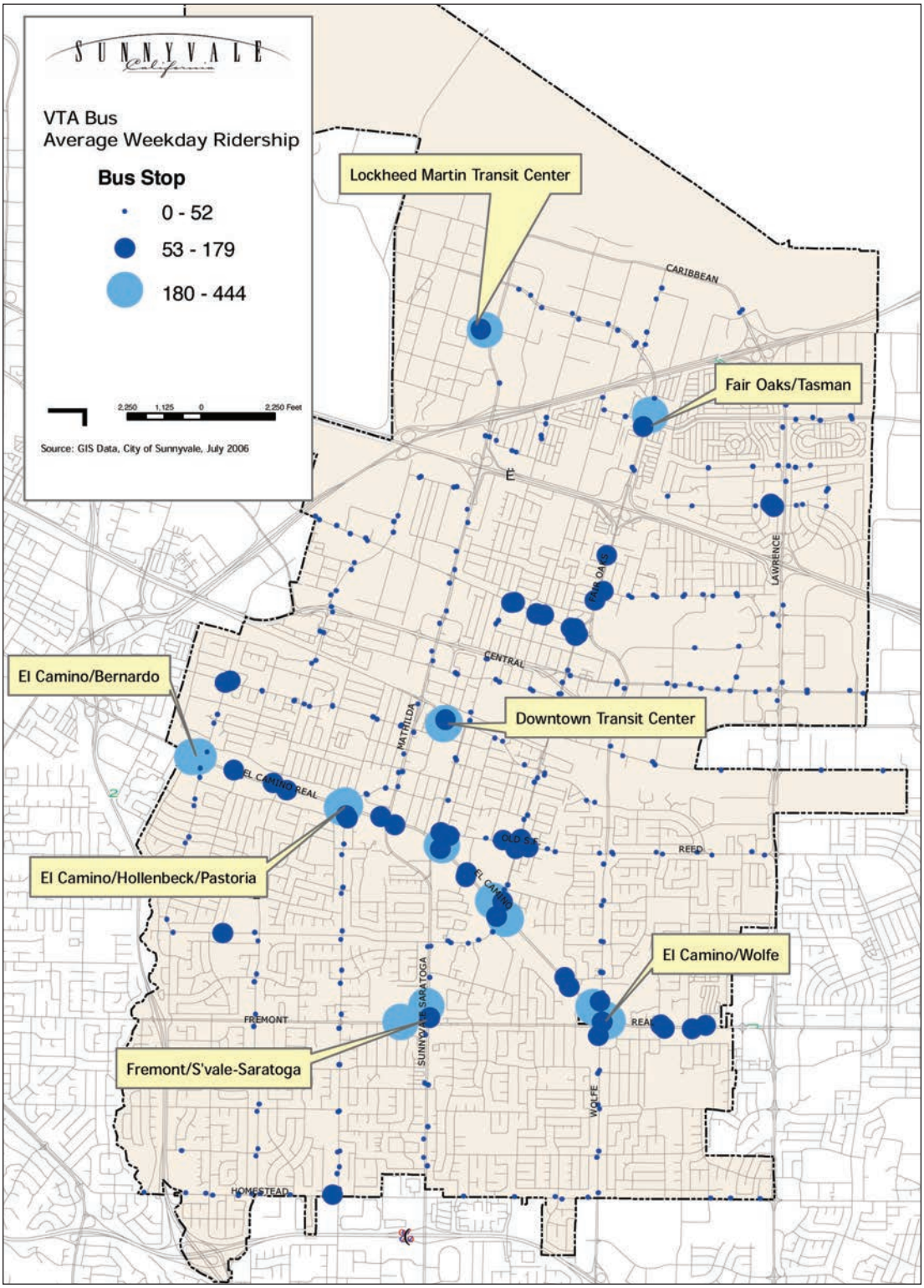
Moffett Park Station	
Location	North side of Moffett Park Drive between H Street and Lockheed Martin Way
Area served	Lockheed Missiles & Space Company and other workplaces in the area north of US-101 and west of Mathilda Avenue
Future access	Mary Avenue Extension over US-101 and Highway 237, probably to 11th Avenue
Lockheed-Martin Station	
Location	West side of Mathilda Avenue between 5th Avenue and 6th Avenue Bus transit center on south side of 5th Avenue between Mathilda and C Street
Area served	Workplaces in the "Lockheed" area north of US-101 and west of Mathilda Avenue, also on Bordeaux Drive via 5th Avenue
Future access	Mary Avenue Extension over US-101 and Highway 237, probably to 11th Avenue
Borregas Station	
Location	Median of Java Drive just west of Borregas Avenue (Moffett Park)
Area served	Workplaces on Java Drive, Borregas Avenue, and nearby streets
Future access	Borregas Avenue (N-S): Bike bridges over Highway 237 and US-101
Crossman Station	
Location	Median of Java Drive just west of Crossman Drive (Moffett Park)
Area served	Workplaces on Java Drive, Crossman Drive, Moffett Park Drive (east and west of Java), and east of Crossman Drive
Future access	Borregas Avenue bicycle bridges over Highway 237 and US-101
Fair Oaks Station	
Location	Median of Tasman Drive just east of Fair Oaks Avenue
Ridership	226 (July-December 2005; see Table 2.9) Expected to increase as Tasman-Fair Oaks housing opens
Area served	Tasman - Fair Oaks housing. Fox Hollow and El Dorado Mobile Home Parks. Weddell Drive workplaces via Fair Oaks, Morse, and future internal street. Casa de Amigos and Plaza del Rey MHPs if pedestrian shortcuts are added.
Future access	Borregas Avenue (N-S): Bike bridges over Highway 237 and US-101 East Channel (N-S): Pedestrian improvement shown in Tasman/Fair Oaks Bicycle/Pedestrian Circulation Plan. Useful as bicycle link between eastbound Tasman and John W. Christian Greenbelt.
Vienna Station	
Location	Tasman Drive at Vienna Avenue, just west of Lawrence Expressway
Area served	Casa de Amigos and Plaza del Rey Mobile Home Parks
Future access	No changes anticipated
Reamwood Station	
Location	Tasman Drive at Reamwood Avenue
Area served	Workplaces north of Tasman Drive, east of Lawrence Expressway, and west of Calabazas Creek. Adobe Wells Mobile Home Park. Residential area south of Adobe Wells MHP via Calabazas Creek Trail.
Future access	Calabazas Creek Trail: low-water undercrossing of Tasman Drive

VTA BUSES

VTA operates all transit buses in Santa Clara County; all have two-bike front mounted racks. An additional two bicycles may be brought aboard at driver's discretion, typically at times of day when a given bus is fairly empty.

Figure 2.13 shows ridership at VTA bus stops in Sunnyvale. Many of the busiest bus stops in the City are located on El Camino Real, which is served by VTA's highest-productivity bus line, the 22 Local/522 Rapid. Other major stops include the downtown Transit Center on Frances Street and Evelyn Avenue at the Sunnyvale Caltrain station, the Lockheed Martin Transit Center and Fair Oaks Avenue at Tasman Drive (Light Rail stations) and Fremont Avenue at Sunnyvale-Saratoga Road (Fremont High School).

Figure 2.13
VTA bus ridership by stop



VTA does not track bicycle boardings and alightings by bus stop. Table 2.11 summarizes total average weekday boardings and alightings for the seven highest-ridership bus stop clusters. Each sub-table includes the high-ridership stop and immediately adjacent lower-ridership stops.

Table 2.11
Average weekday ridership for major bus stop clusters

Bus Stops	Dir	Streets	Routes	On	Off	Total
El Camino/Wolfe	S	Wolfe at El Camino	26	39	98	137
	W	El Camino at Wolfe	22, 522	195	197	392
	E	El Camino at Wolfe	22, 522	174	169	343
	N	Wolfe at El Camino	26	70	108	178
				478	572	**1050**
Downtown Transit Center	S	Frances at Capella	32, 55, 150	161	117	278
	N	Frances at Capella	26, 32, 54, 55	189	231	420
	W	Evelyn at Frances	53, 54	10	2	12
	N	Frances at Capella	53, 140	90	74	164
				450	424	**874**
Fremont/Sunnyvale-Saratoga (Fremont High School)	S	Sunnyvale-Saratoga at Fremont	55	12	270	282
	W	Fremont at Sydney	55	224	6	230
	N	Sunnyvale-Saratoga at Fremont	55	73	13	86
				309	289	**608**
Lockheed Martin Transit Center	E	5th Street at Mathilda	120, 121, 122, 321, 328, ACE	92	110	202
	E	5th Street at Mathilda	26	67	64	131
	E	5th Street at Mathilda	54	20	25	45
				179	199	**378**
Fair Oaks/Tasman (by LRT station)	N	Fair Oaks at Tasman	26, 54	75	161	236
	S	Fair Oaks at Tasman	26	81	5	86
				156	166	**322**
El Camino/Mary	W	El Camino at Mary	22	23	60	83
	E	El Camino at Mary	22	43	38	81
				66	98	**164**
El Camino/Mathilda	W	El Camino at Mathilda	22	36	45	81
	E	El Camino at Mathilda	22	44	38	82
				80	83	**163**

Source: VTA, April 2006

Table 2.12

Bicycle access to major bus stop clusters

Bus Stops	Bicycle Access
El Camino/Wolfe	Wolfe: Bike lanes south to Cupertino. Shared Lane Markings between El Camino and Reed Avenue. Linden and Gail Avenues form a partial north-south parallel alternative a short distance to the west.
Downtown Transit Center	Evelyn Ave (E-W): Future Bike Lanes Washington Ave (E-W): Bike route to west Sunnyvale Ave (N-S): Bike Lanes south of Evelyn
Fremont/Sunnyvale-Saratoga	Fremont Avenue: Bike lanes Sunnyvale-Saratoga Road: Bike Lanes
Lockheed Martin Transit Center	Manila Drive, H Street, and 5th Avenue from the west. 5th Avenue, Bordeaux Drive, and Moffett Park drive from the east. Caribbean Drive and Mathilda Avenue from the north and east.
El Camino/Mary	Mary Avenue: Bike route north-south Future Mary Avenue Extension bridge over US-101 and Highway 237
El Camino/Mathilda	Sunnyvale-Saratoga Rd: Bike Lanes to south (into Cupertino) Hollenbeck Ave/Pastoria Ave (1 block west): north-south bike route

2.5 Bicycle Parking

Sunnyvale sets an example for office and commercial developments by providing bicycle parking at City buildings and facilities. Bicycle racks and lockers are not currently required at developments except at multifamily residences as addressed by the Zoning section of the Municipal Code. However, transportation planning staff reviews development proposals and applies bicycle parking standards from the VTA Bicycle Technical Guidelines. The following tables summarize bicycle parking facilities at City buildings, in downtown, along El Camino Real, and at transit stations and selected workplaces. Figure 2.15 is a map of bicycle parking at transit stations and public facilities.

CIVIC BUILDINGS

Site	Address	Location	Bicycle parking	# Bikes
City Hall and Public Works	456 W. Olive	Main entrance	(1) 3-wave, 2-side access	6
		Rear entrance	(1) 3-wave, 2-side access	6
		Council entrance	(1) 3-wave, 2-side access	6
		Staff parking lot	(1) 2-door bike locker	2
		Garden Room area	(1) 2-door bike locker	2
Library	Olive Avenue	Entrance plaza	(2) 4-wave racks, 2-side access	16
		Entrance plaza	(1) bike locker (padlock hasps)	2
Community Center	550 E. Remington	Senior Center	(1) 3-wave, 1-side access	4
		Recreation Center	(1) 4-wave, 2-side access	8
		Theatre	(1) 4-wave, 2-side access	8
		Creative Arts Center	(1) 3-wave, 1-side access	4
CA EDD*		Main entrance	(1) PW-Loop-8, 1-side access	8

** State of California Employment Development Department*

DOWNTOWN

Site	Location	Bicycle Parking	# Bikes
Plaza del Sol, Frances at Evelyn	(distributed)	(14) inverted U, 2-side access	28
Bus Transfer Center, Frances	East curb	(2) 3-wave, 2-side access	12
Murphy Avenue parking lot	NE corner	(1) 3-wave, 2-side access	6
Murphy Avenue	Sidewalk	(2) inverted U, 2-side access	4

Figure 2.14
Bicycle parking and storage examples


Bike racks at Caltrain station


Bike rack at Orchard Supply Hardware


Ariba bike lockers at Moffett Park LRT


Shared bike storage room at condominium

TRANSIT STATIONS

Site	Location	Bicycle Parking	# Bikes
Sunnyvale Caltrain station	Evelyn at Frances	Lockers, long-term rental (Caltrain)	75
		Lockers, day-use (padlock hasp)	25
		Racks: 15 Creative Pipe LR-P, 1-side	15
Lawrence Caltrain station	Lawrence Expwy at San Zeno Way	Lockers: long-term rental (Caltrain)	43
		Racks: (2) 5-wave, 2-side	22
Lockheed-Martin Light Rail station/ Transit Center	Mathilda Avenue at 5th Avenue	Lockers: long term rental (VTA)	16
Fair Oaks Light Rail station	Tasman Drive at Fair Oaks Avenue	Lockers: long-term rental (VTA)	12

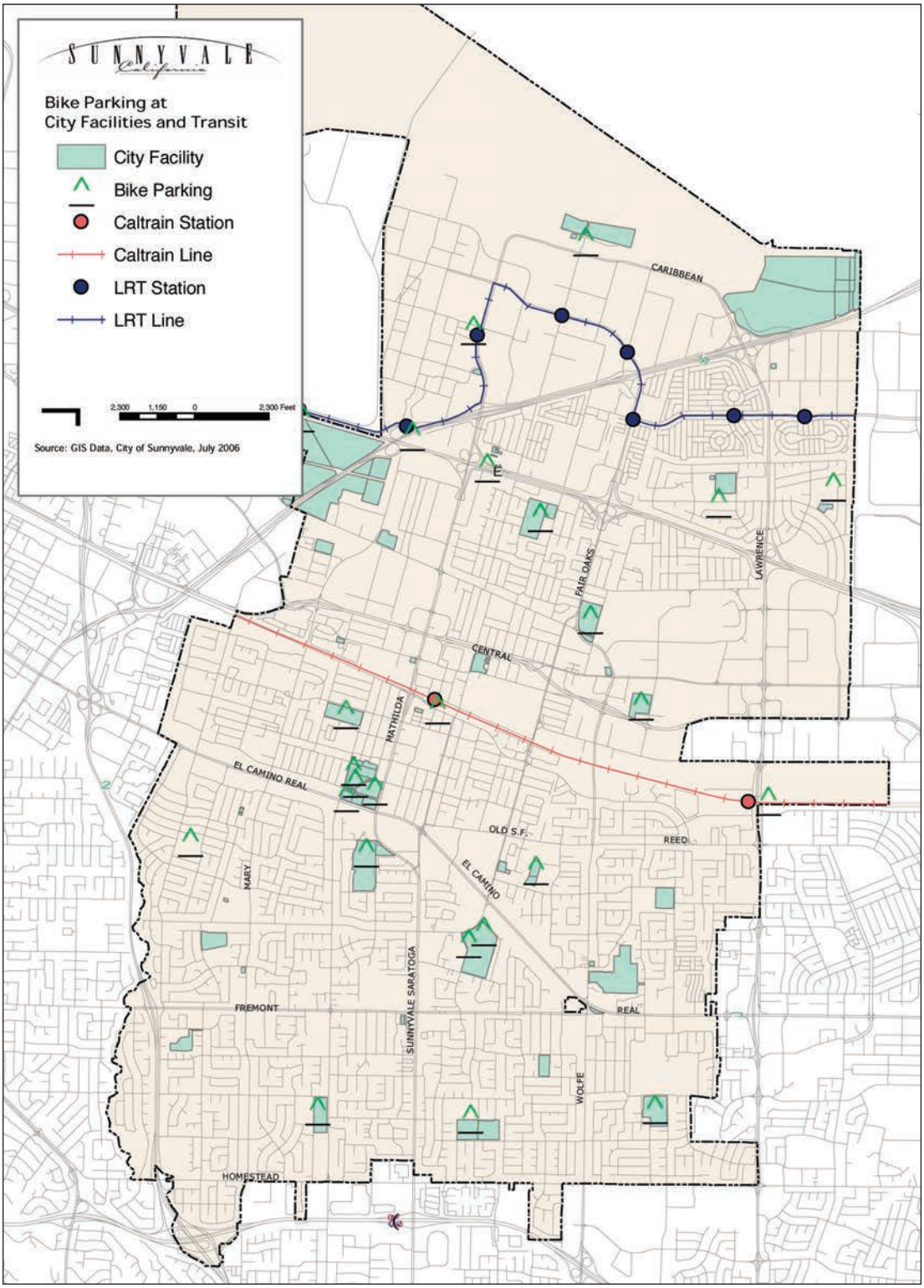
MOFFETT PARK BUSINESSES (SAMPLE)

Employer, Location	Bicycle parking and storage	Clothing storage and changing facilities	Showers
Ariba/Interwoven/Juniper/ Motorola complex (Ariba headcount: 366) 807 11th Ave. near Moffett Park Light Rail station	73 bike locker spaces with hasps for user-provided locks	Clothing lockers in fitness center (day-use only; no long-term assignment)	Showers in fitness center and on first floor of Building 2
Juniper Networks 1194 North Mathilda Ave. (in Ariba complex)	Employees use Ariba bicycle lockers Bike racks in front of each Juniper building except A3, total 3 racks each with 10-bike capacity	6 clothing storage lockers for day use by cyclists (not permanently assigned)	3 private shower rooms in Building 1 and also in fitness center (for fitness center members)
Lockheed Martin Multi-building campus north of 11th Avenue and west of Mathilda Avenue	20 bike locker spaces Bike racks at several buildings, capacity approximately 140 bicycles Campus bicycle fleet program for travel within the complex.	Day-use clothing lockers at Fitness Center. In select buildings, a small number of clothing lockers are available for overnight use on a first-come, first-served basis (employees provide own locks).	Showers in Fitness Center, available to all employees. The Fitness Center and showers are not available to contractors.
Yahoo! 701 First Avenue	106 bike locker spaces. 12 are day-use.	Available in Fitness Center for temporary day use	Available to employees in Fitness Center. Showers in 3 other buildings are available to all employees, temps, contractors, and interns.

CENTRAL SUNNYVALE BUSINESSES (SAMPLE)

Business	Address	Bicycle Parking	Sides	Bikes
Safeway	1236 W. El Camino	(8) PW-Loop	1	8
Fresh Choice	1105 W. El Camino	(8) PW-Loop	1	8
Chevron Car Wash	1005 W. El Camino	(1) 3-wave	1	4
Camino West plaza	604-620 W. El Camino	(1) Cora-8 in car stall	2	8
(New retail plaza)	SW corner at Mathilda	(1) Bike locker, S. side	2	2
Starbucks	332 W. El Camino	(1) inverted U	2	2
Postal Annex	302 W. El Camino	(1) inverted U	2	2
P.F.Chang's	390 W. El Camino	(1) inverted U	2	2
Orchard Supply Hardware	777 Sunnyvale Saratoga Rd	(8) PW-Loop	1	8
Pak-N-Save Foods	762 Sunnyvale Saratoga Rd	(1) 10-foot comb	2	10
Sports Authority	125 E. El Camino	(1) 3-wave	22	6
Drug Barn	150 E. El Camino	(1) 10-foot comb	1	5
Armadillo Willy's	161 E. El Camino	(1) 10-foot comb	2	10
Camino Medical Group	413 E. El Camino	(1) 3-wave	1	4
Hot Breads	464 E. El Camino	(1) 2-wave	1	0
R&K Comics and Cards	568A E. El Camino	(1) 3-foot comb	1	2
Remington Health Center	500 E. Remington Drive	(8) PW-Loop, in lot	1	8
Best Buy	760 E. El Camino	(1) 2-wave	2	5
Pet Smart	776 E. El Camino	(1) 2-wave	2	5
Rite Aid	777 E. El Camino	(2) inverted U	2	4
Washington Mutual	791 E. El Camino	(1) inverted U	2	2
Blockbuster Video	799 E. El Camino	(1) inverted U	2	2
Bell Plaza	1040-1060 E. El Camino	(2) inverted U	2	4
Carl's Junior	1050 E. El Camino	Park-Rite 5	1	5
Mathilda Place offices	190 Mathilda	2 sets of (3) inverted U	2	12

Figure 2.15
Bicycle Parking at Transit Stations and Public Facilities



2.6 Safety

Sunnyvale's transportation staff regularly analyzes collision data, including records of bicycle-involved collisions, for patterns that can be addressed by engineering, education or enforcement. Collision records are promptly entered in the City's collision database by Public Safety officers, providing a constantly updated picture of bicycle safety issues as reflected by crashes.

In 2002, the City obtained the assistance of MTC's Safety Technical Assistance Program ("SafetyTAP"), which performed a more in-depth analysis of three years of bicycle-involved crash data. These results are described in more detail below; the bicycle-related pages from the SafetyTAP report are reproduced as Appendix D.

MTC SAFETY TAP STUDY

The Metropolitan Transportation Commission's Bicycle/Pedestrian Safety Technical Assistance Program ("SafetyTAP") analyzed Sunnyvale's 133 reported bicycle-involved collisions for the 3-year period from July 1999 through June 2002 based on several factors. The SafetyTAP study also reviewed Sunnyvale's existing programs, policies, practices and resources.

The following tables summarize the study's key findings. Notes and recommendations appear after each table. Table 2.13 identifies the main collision factors involved in bicycle incidents. Right-of-way violations, mostly by motorists, are a leading factor. For bicyclists, wrong-way riding is a significant issue.

Table 2.13
Bicycle-Involved Collisions by Primary Collision Factor, July 1999 – June 2002
RT = Right Turn

Primary Collision Factor (PCF)	Count (%)		Motorist-at-fault and Factors		Bicyclist-at-fault and Factors	
Right Of Way	40	(30%)	32	(80%)	8	(20%)
Improper Turn	25	(19%)	21	(85%), mostly RT cutoff	4	(15%)
Bicycle Wrong Way	23	(17%)	0	(0%)	23	(100%)
Failure To Yield at Signals and Signs	9	(7%)	0	0%	9	(100%) exiting driveway or alley onto minor road
Subtotal	**97**	**(73%)**	**53**	(55%)	**44**	(45%)
Other	36	(27%)				
TOTAL	**133**	**(100%)**				

Of the collisions where Right Of Way violation was the PCF, the motorist was at fault in 32 of 40 cases (80%). In addition, 83% of those motorists were male – mostly between 30 and 45 years old. The motorist-caused collisions of this type tended to involve either:

- Oncoming left turns (mostly daytime with clear weather, all on major roads, half at signals and half with no controls), or
- Failure to yield when exiting a driveway or alley (mostly onto minor streets)

Bicyclists were at fault in the remaining eight collisions where Right Of Way violation was the PCF. All of the bicyclists in these incidents were male, and all but one was under 16 years old. All eight collisions involved failure to yield when exiting a driveway or alley onto a minor street. Interestingly, all eight motorists were female.

In 21 of the 25 collisions where the PCF was Improper Turn, the motorist was at fault and typically executed a "right-turn cutoff" (overtaking and then turning right in front of a bicyclist).

In all collisions where the PCF was Failure To Yield, bicyclists were at fault and were exiting driveways or alleys onto minor streets.

As these results illustrate, bicyclist failure-to-yield when exiting driveways and alleys, also known as "darting out", is a significant collision factor in Sunnyvale (19 of 44 collisions where the bicyclist was at fault, second only to the 23 wrong-way incidents). Darting out is mostly a youth behavior that can be addressed through education in schools, a "driveway ride-out" teaching station in a bicycle rodeo, and "bicycle diversion" classes. Sunnyvale's bicycling education programs offer all three channels.

Table 2.14 examines the crash types associated with various forms of intersection control.

Table 2.14

Bicycle-Involved Collisions by Intersection Factor, July 1999 – June 2002

LT = Left Turn, RT = Right Turn, RLR = Red-Light Running, WW = Wrong Way

Location	Count	(%)	Type	Motorist fault and Factors	Bicyclist fault and Factors
Intersection	77	58%	64% Controlled	65% (LT, RT)	35% (Mostly RLR, WW)
			36% Uncontrolled	50% (LT)	50% (WW, Improper Turn)
Non-intersection	56	42%		Improper RT, Entering traffic from driveway or alley	1) WW (mostly male adults), 2) Dart-out (mostly minors, all male)
TOTAL	**133**	**100%**			

Because bicyclists ride wrong-way for several different reasons, it may be useful for staff's periodic collision analysis to identify age, behaviors, and other factors involved in wrong-way incidents.

Many inexperienced bicyclists believe that it is safer to face oncoming traffic, perhaps based on the valid pedestrian safety guidance to walk facing traffic on roads without sidewalks. Riding against traffic on the roadway is the local practice in some parts of the world. Bicyclists who ride on the sidewalk may not realize that motorists do not expect them to enter the intersection from the "counter-flow" direction.

Some bicyclists mostly ride in the same direction as other traffic, but ride wrong-way to avoid crossing an

arterial roadway twice when their origin and destination are on the same side. Some also turn left improperly by briefly crossing to the left-hand curb shortly before the intersection. In cities with one-way streets, wrong-way riding reduces distance compared to going around the block.

Table 2.15 breaks out crashes by injury severity, and notes the patterns associated with severe or moderate injuries. When analyzing motor vehicle-only collisions a non-injury/injury ratio of 2:1 or higher is expected, assuming that Property Damage Only collision reports are taken by the local law enforcement agency. In contrast, it is common for non-injury bicycle-involved collisions to be unreported, and many uninjured or barely-injured bicyclists will not stop to exchange contact information.

Table 2.15
Bicycle-Involved Collisions by Injury Severity, July 1999 – June 2002

Injury Severity	Count	%	Notes
Fatal	2	2%	
Serious	7	5%	Mostly motorist fault, improper turn Bicyclist victims: males < 18, males 19-25
Other Visible Injury	60	45%	
Complaint of Pain	54	41%	
Property Damage Only	10	8%	
TOTAL	**133**	**100%**	

Possible reasons for "motorist at fault, improper turn" bicycle-involved collisions may include poor bicyclist visibility (dark clothing, no lights) or through movements made too close to the right hand curb - or even in the adjacent marked crosswalk. Review of individual collision reports to determine probable bicyclist line of travel can determine whether the latter behavior is a significant contributing factor in these types of crashes, and Sunnyvale staff performs such analysis.

Table 2.16 examines patterns associated with lighting conditions.

Table 2.16
Bicycle-Involved Collisions by Lighting Conditions, July 1999 - June 2002

Lighting Condition	Count	%	Notes
Daylight	108	81%	
Dark – street lights	16	12%	Motorists and bicyclists equally at fault. 72% at intersections; 50% uncontrolled Cyclist ages: about 50% are 17-25, regardless of fault 50% involve Serious or Other Visible injury severity.
Dusk or Dawn	8	6%	
Dark – No street lights	1	1%	
TOTAL	**133**	**100%**	

Poor bicyclist visibility is often a factor in after-dark collisions. If an analysis of the 17 crashes that occurred under dark conditions revealed many unlighted bicyclists, promotion of headlight and taillight use could be considered. However, because at least 50% of cyclists involved in non-daylight crashes were 17 or older, schools cannot be the only means of delivering the message. Retail workers using bicycles to commute might be reachable through flyers and promotional coupons, possibly in Spanish-language publications or through workplaces.

Table 2.17 examines the top five locations for bicycle-involved collisions.

Table 2.17
Bicycle-Involved Collisions - Top Locations, July 1999 – June 2002

E-W = East-West, N-S = North-South

#	Primary Street	Secondary Street	Count	Notes
1	El Camino Real	Mary Avenue	5	Mary = Key N-S corridor
2	El Camino Real	Between Cezanne Dr and Fair Oaks Ave	3	Retail on both sides of El Camino
3	El Camino Real	Mathilda Ave	2	Mathilda = Key N-S corridor, near downtown
4	Mathilda Ave	Olive Ave	2	Olive = Key E-W corridor to downtown
5	Mary Ave	Olive Ave	2	Olive = Key E-W corridor near downtown
		TOTAL	**14**	**(11% of 133 total)**

Although 14 crashes is not a large fraction of the total, it is interesting that so many of the top five locations are either on El Camino Real or within one signal of it. This may simply reflect higher bicycle activity near commercial land uses, or possibly bike-on-transit use on El Camino's busy 22 and 522 bus lines.

WORK ZONE PROCEDURE

In addition to retrospective analysis, Sunnyvale applies proactive safety practices to reduce the likelihood of crashes. For example, the City's Standard Operating Procedure titled "Bicycle and Pedestrian Safety Through Work Zones" sets standards and guidelines for the following items:

- Warning signs types and locations
- Bike lane closures
- Sidewalk closures
- Work zones where no travel lanes are closed
- Nighttime visibility
- On-street storage of equipment
- Complaint procedures

This Standard Operating Procedure appears as Appendix C.

BICYCLE HAZARD REPORTING CONTACT

The City's website includes a Bicycle and Pedestrian Improvement Request form for reporting hazards or requesting enhancements to bicycle facilities. The webpage containing the form also lists phone and email contacts for reporting hazards on Sunnyvale streets, Santa Clara County expressways, and Caltrans facilities such as El Camino Real.

2.7 Education and Encouragement

Bicycling improves personal health and fitness, and each trip made by bicycle rather than by motor vehicle improves the environment. For children, bicycling builds an active lifestyle and offers age-appropriate independence and personal mobility. For older adults, cycling provides everyday fitness and recreation to counter the aging process.

Improving Sunnyvale's streets provides the environment needed for pleasant and convenient cycling. Education and encouragement help the City's residents and workers of all ages to discover the route options and destinations reachable by bike. Street cycling classes for children and adults create safer and more confident bicycle drivers.

SUNNYVALE BICYCLE MAP

A bicycle map is a key part of an education program because it shows routes that cyclists might not otherwise discover, and lets cyclists select routes that meet their needs for directness and comfort. Figures 2.19 and 2.20 show the front and back of the City's 2005 Bicycle Map.

"RECOMMENDED COMPETENCE" RATINGS

The Bicycle Map uses line color and style to indicate facility type, existing vs. planned, and recommended skill levels (see legend at right). Solid-color lines indicate existing bike lanes (Caltrans Class II), signed routes (Caltrans Class III), and paths (Caltrans Class I paved facilities, bike bridges, several unpaved paths in the Baylands, plus one-block "shortcuts" that are also useful for walkers. "Access points" (tan dots) show where users can enter a path.

All major Sunnyvale street segments with neither bike lanes nor bike route signs are shown in white with a color border denoting suggested skill level for riding during peak traffic periods, as explained on the back of the map:

Beginner – Indicates a street with low traffic volumes and speeds. These streets are suited for use by individuals with limited competency in cycling ability and some knowledge of safety rules and the rights and responsibilities of cyclists and motorists.

Intermediate – Indicates a street with moderate speeds and traffic volume. Bicyclists must share the road with vehicles; however, there is typically enough room for this to be accommodated comfortably. It is suited for individuals knowledgeable of the safety rules and responsibilities of the road and who have a basic level of cycling competency.

Advanced – Indicates a street with high speeds and traffic volume. Bicyclists must share the road with vehicles. On these routes, this is typically not accommodated comfortably based on the width of the outside lane and presence of parked vehicles. These routes are suited for individuals who are capable of riding on major roadways, and in high traffic volume with very little difficulty, and are informed and knowledgeable of all safety rules and responsibilities of the road.

Although the solid-color lines do not indicate recommended skill level, bike lanes are "beginner" to "intermediate" by convention.

"Advanced" ratings for Central and Lawrence Expressways reflect high vehicle speeds. The "Advanced" rating for El Camino Real reflects moderately high vehicle speeds combined with conflicts at driveways and intersections.

The Bike Map also shows schools, parks, community center, civic and downtown areas, rail lines, stations, transit centers, and fire stations. Bike lanes and paths in adjacent cities are shown as well.

Future facilities shown are funded and to be constructed in the near future. These include bike lanes on the full length of Evelyn Avenue and on Mary Avenue between Fremont Avenue and Homestead Road, the bike/pedestrian bridges on Borregas Avenue at US-101 and Highway 237, and the bike/pedestrian bridge across I-280 at Mary Avenue including a connector path to Homestead Road.

The back of the map presents illustrated information about safe and legal bicycling, including local and regional bicycle resources. It covers bikeway facility types and route selection, the Sunnyvale Bicycle & Pedestrian Advisory Committee, and local, regional and national bicycle organizations. It also provides education regarding combining bicycles with transit, including bike locker rental contacts, and bicycle registration.

CITY BICYCLING WEBPAGE

The City has an informational webpage of bicycling resources: biking.inSunnyvale.com. In addition to staff contact information, this webpage has links to:

- The Sunnyvale Bicycle Map, including the safety and commuting tips found on the back side
- Bicycling Street Smarts, a 40-page illustrated bicycle driver education booklet by John Allen, available online and in print
- A Bicycle and Pedestrian Improvement Request form, which also provides information for County Roads facilities (Central and Lawrence Expressways) and State facilities (El Camino Real, and freeway interchanges)
- Local, state, and national bicycle resources including clubs, advocacy groups, bicycle advisory committees, online bicycle commute trip planners, and transit options
- Agendas and minutes of the Sunnyvale Bicycle and Pedestrian Advisory Committee (BPAC)

Figure 2.16
Sunnyvale 2005 Bicycle Map (front)

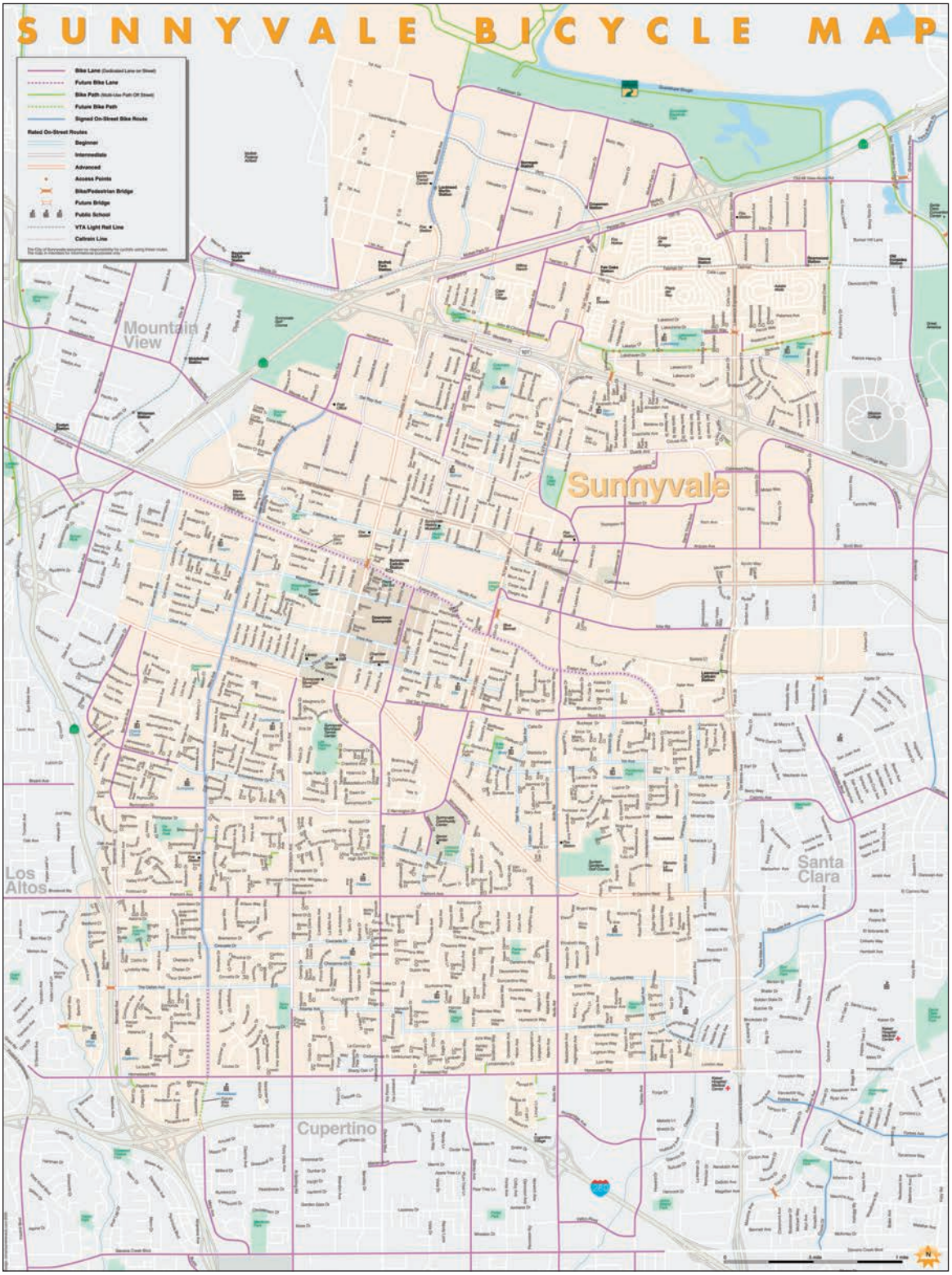


Figure 2.17
Sunnyvale 2005 Bicycle Map (back)

YOUTH EDUCATION

ELEMENTARY SCHOOL "SAFE ROUTES TO SCHOOL" PRESENTATIONS

Sunnyvale's Department of Public Safety has four Neighborhood Resource Officers (NROs) who offer an annual presentation for elementary school students on safe walking and bicycling. Schools request this presentation from Public Safety. A letter to parents at the start of the school year reviews traffic safety issues around their child's school. Neighborhood Resource Officers also offer one-on-one education in the field.

MIDDLE SCHOOL PROGRAM: "DRIVE YOUR BIKE"

In a two-year pilot program, physical Education (PE) classes in Sunnyvale middle schools attend a three-session education program called "Drive Your Bike", created by the Traffic Safe Communities Network in Santa Clara County (TSCN), a joint initiative of the National Highway Traffic Safety Administration (NHTSA), California Office of Traffic Safety (OTS), and Santa Clara County's Public Health Department. This was delivered at Sunnyvale Middle School in 2005 and at Columbia Middle School in 2006.

Each session lasts 40 to 45 minutes. The first two are lecture-style; they begin with the importance of helmets and how to fit one, then explain safe bicycle movements in traffic and the parallels with safe driving of a car. The hands-on third session, called the "On The Bike Challenge", covers helmet fitting (helmets are provided free if parents cannot afford them), bike maintenance checks, and bicycle handling skills training (obstacle avoidance, quick stops, "slow race"). No on-street training is conducted.

IN-THE-FIELD EDUCATION BY NEIGHBORHOOD RESOURCE OFFICERS

Neighborhood Resource Officers with Sunnyvale's Department of Public Safety conduct as needed on-the-spot education of young cyclists in the field.

YOUTH "BICYCLE DIVERSION" CLASSES

Officers with Sunnyvale's Department of Public Safety cite bicyclists under age 18 for not wearing helmets and for traffic violations. Violators can have their ticket voided by attending a 2-hour "bicycle diversion" class along with their parents. This lecture-and-discussion class (no on-bike content) is held on a Saturday every month or two depending on demand (more frequently during summer months). As part of the class, a survivor of a bicycle crash discusses the need for helmet use and safe bicycle driving. Approximately 300 children per year (average 25 per month) attend this class.

ANNUAL BICYCLE SAFETY RODEO AT HEALTH & SAFETY FAIR

Each year in early May, the City holds a Health and Safety Fair that is well attended (approximately 1,500 in 2005). A bicycle safety rodeo is held at this event, including:

- Helmet fitting
- Free helmets for children whose families cannot afford helmets
- Free bicycle inspection and adjustment by a local bicycle shop
- An off-street, on-bicycle skills course by State Farm Insurance, including mounting, dismounting, and riding circles, figure-8s, and slaloms
- A miniature "Safe City" intersection with pedestrian and bicycling safety instruction
- A performance and talk by the "Perfection on Wheels" bicycle stunt team, with inspections of bicycles and safety equipment (pads, helmets) for children interested in "BMX" skills such as riding on half-pipes

3 Issues and Findings

3.1 Bikeway Network

OBSTACLES

The Bicycle Capital Improvement Program (CIP) described in Section 5 identifies the improvements needed to complete bicycle accommodation on each arterial and collector street segment. For arterials and most collectors, the desired final accommodation type is bicycle lanes.

Since the 1993 Bicycle Plan, Sunnyvale has added bike lanes to many miles of arterial and major collector streets. However, key segments of north-south arterials still lack bike lanes or wide outside through lanes. On many of these segments parking (if present) cannot easily be removed or restricted, peak-period traffic volumes preclude a reduction in the number of travel lanes, and widening is infeasible or prohibitively expensive.

The following table highlights bicycle accommodation challenges on CIP segments.

Table 3.1
Key corridor obstacles to adding bicycle lanes

Street	Segment(s)	Notes
Mathilda Avenue	Moffett Park Drive to Ahwanee Avenue	US-101 interchange will not be widened
	Ahwanee Avenue to Maude Avenue	Widening may be difficult
	Maude Avenue to California Avenue	Restriping may be possible
	Washington Avenue to El Camino Real	Opportunity to re-stripe for wide (14') outside lanes Widening would be required to add bike lanes.
Fair Oaks Avenue	Fair Oaks Way to US-101 north signal	Minor widening would be needed to add bike lanes
	US-101 interchange (Weddell Drive to Ahwanee Ave.)	Restriping may be possible to create wider outside lanes across the freeway
	Ahwanee Avenue to Maude Avenue	Widening would be needed to add bike lanes
	Maude Avenue to Arques Avenue	Residential frontage; parking modifications may be infeasible
	Arques Avenue to Kifer Road	Restriping may be possible to create wider outside lanes
Wolfe Road	Reed Avenue to Fremont Avenue	Shared Lane Markings combined with low parking occupancy and relatively high vehicle speeds. Parking removal or daytime restrictions or minor widening would be needed to add bike lanes.

OPPORTUNITIES

This section discusses opportunities for enhancing existing segments of Sunnyvale's bikeway network. Some of these options are found in the City's Bicycle Capital Improvement Program; others depend on plans and projects of other cities and agencies.

MARY AVENUE

Mary Avenue is the key north-south bikeway in the western third of Sunnyvale because it reaches from Homestead Road almost to US-101, unlike Bernardo Avenue or Hollenbeck/Pastoria Avenues. The street's importance for bicycling will increase when the Mary Avenue/I-280 bicycle-pedestrian overcrossing makes a nonmotorized connection to Cupertino, and will increase further when the Mary Avenue Extension over US-101 and Highway 237 is added. The Extension will have bike lanes.

South of Central Expressway, Mary Avenue is mostly residential with curbside parking. Its southernmost mile has bike lanes. Extending the bike lanes across El Camino, Evelyn Avenue, and Central Expressway may require a combination of daytime parking restrictions - possibly on one side of the street - and a minor widening north of Central. Between Evelyn Avenue and Central Expressway, the variation in available width and the intersection storage requirements for three signals and the Caltrain crossing constrain possible striping configurations.

Because motor vehicle volumes are expected to increase substantially when the Mary Avenue Extension is added, all bike lane segments on Mary should be completed concurrently with that project.

MAUDE AVENUE

The office park areas in north central Sunnyvale, between US-101 and Central Expressway, are fairly well connected internally for bicycling. There are bike lanes on almost all streets in the office/industrial area bounded by Wolfe Road, Duane Avenue, and the Caltrain line. West of Mathilda Avenue, bicycle access to workplaces is provided by bike lanes on Maude Avenue, northern Mary Avenue, and Almanor Avenue, augmented by a network of low-volume internal streets.

Maude Avenue and Duane Avenue are the key east-west connectors between these two areas. The Capital Improvement Program proposes adding bike lanes to Duane Avenue by reducing the number of travel lanes, which appears feasible due to relatively low traffic volume. This approach cannot be used on Maude Avenue between Pastoria Avenue and Wolfe Road because Maude needs all of its existing lanes, and substantial demand precludes parking restrictions. The Capital Improvement Program proposes a minor widening on this approximately one-mile segment.

MOFFETT PARK DRIVE WEST OF MATHILDA

Moffett Park Drive is part of an important east-west subregional bikeway through Sunnyvale, connecting the Middlefield Road/Ellis Street/Manila Drive bike lane corridor through Sunnyvale to a route that follows the Highway 237 corridor into Milpitas. Most of Moffett Park Drive, from Bordeaux Avenue to Caribbean Drive, now has bike lanes. Its two remaining CIP segments are west of Mathilda Avenue (Manila to Mathilda) and the block east of Mathilda (Mathilda to Bordeaux Drive). On the segment west of Mathilda, widening appears to be infeasible due to the Light Rail line on the north side and the freeway ramp on the south side. East of Mathilda, a landscape area on the north side would enable widening for bike lanes, and adding a sidewalk to close the pedestrian circulation gap between Mathilda and Bordeaux.

SUNNYVALE AVENUE NORTH OF EVELYN AVENUE

Because of the east-west barriers formed by the Caltrain and Central Expressway corridors, Sunnyvale Avenue between Evelyn Avenue and Maude Avenue is the only north-south connection between downtown and the Sunnyvale Caltrain station and the northern half of the City. The importance of this approximately one-mile segment will increase substantially when the Borregas Avenue freeway overcrossings are completed.

Much of this segment has single family homes on both sides, with attendant on-street parking demand. To provide bike lanes on both sides of the street during weekday commute periods, the Capital Improvement Program proposes a full-time bike lane with parking on the west side and a daytime bike lane on the east side that would become a parking lane on evenings and weekends. The east side was selected for this time-of-day configuration because approximately half of its frontage between Evelyn and Maude is occupied by Bishop Elementary School, Murphy Park, and other non-residential uses.

EL CAMINO REAL

El Camino Real serves many of Sunnyvale's commercial destinations and runs close to City Hall, the Library, and the Community Center. Many bicyclists work, shop, and live along the corridor, which carries VTA's highest-ridership bus lines (Routes 22 and 522).

Bike lanes would be desirable for the full length of El Camino in the City. Much of the corridor already has wide, shareable outside lanes. Most fronting properties have off-street parking and no need for curbside parking, so parking removal could provide the needed width in most locations. City practice is to negotiate parking removal with owners as properties redevelop.

The Bicycle Opportunities Study indicated that it should be possible to obtain the width needed for bike lanes by restriping. However, on some segments this would result in travel lanes narrower than Caltrans' standard 12' width, requiring a design exception. Caltrans' willingness to approve a design exception and the level of documentation it requires to apply for one both depend on the degree to which the operation of a requested configuration would differ from agency standards.

For travel lane width, 11' appears to be a significant Caltrans threshold. During its participation in the City of Palo Alto's Master Schematic Design Plan Study for El Camino Real, Caltrans agreed to a "planning-level exception" for 11' lanes but said that a detail-level exception would continue to be required for 10.5' lanes. The planning-level exception approach represents a significant policy change that would:

*".... [allow] a community to seek Caltrans approval for exceptions ... prior to undertaking more costly detailed design and engineering studies ..." [**El Camino Real Master Schematic Design Plan,** Public Review Draft, Chapter 5: Corridor Concept Plan & Recommended Improvements]*

As a result, this Plan assumes that travel lane widths of 11' may be considered when determining the feasibility of adding bike lanes to El Camino Real through Sunnyvale.

EAST CHANNEL

The East Channel offers several segments of opportunity throughout the City. If constructed, these segments would have value for both recreation and transportation even though they would not be connected across freeways and major arterials except for the existing Lakehaven Terrace/US-101 overcrossing.

Table 3.2
East Channel segments

Segment		Plans , Bicycle Destinations and Notes
a)	North of Caribbean Drive	Would connect to Bay Trail and Sunnyvale Baylands Park
b)	Caribbean Drive to Highway 237	Would connect to workplaces. The value of this segment would mostly be for pedestrian access and recreational bicycle trips because nearby streets offer adequate commuter bicycle access. This segment has been identified in the Moffett Park Specific Plan.
c)	Highway 237 (Persian Drive) to Tasman Light Rail line	Serves the Casa De Amigos and Fox Hollow Mobile Home parks.
d)	Tasman Light Rail to John W. Christian Greenbelt and the Lakehaven Terrace US-101 overcrossing	Serves the Plaza Del Rey, and El Dorado Mobile Home Parks and Lakewood Elementary. There are plans to pave one of the East Channel levees between Tasman and the Greenbelt.
e)	US-101 overcrossing to Wolfe Road	Would serve San Miguel Elementary, Fair Oaks Park, and The King's Academy (private school). The center turn lane on Duane Avenue created by a proposed lane reduction offers an opportunity for a median refuge crossing.
f)	Wolfe Road to Central Expressway	There are plans to develop an Industrial-To-Residential (ITR) site between Wolfe and Arques. If a pedestrian signal was added to the existing Wolfe intersection, ITR residents could reach Fair Oaks Park, San Miguel Elementary, and points north of US-101.
g)	Central Expressway to Caltrain corridor	There are no plans for an over- or undercrossing at Central Expressway.
h)	Caltrain corridor to El Camino Real	There are plans to develop an Industrial-To-Residential (ITR) site between Evelyn Avenue and the Caltrain line. The restriping of Evelyn Avenue will create a center turn lane, enabling consideration of a median refuge crossing. If similar crossings were added at Old San Francisco Road and Iris Avenue, the corridor could connect new and existing residences to Braly Park, Braly Elementary, and commercial destinations on the north side of El Camino.
i)	El Camino Real to Fremont Avenue	The East Channel could connect residences in the Community Center area and points south to commercial destinations on the south side of El Camino.
j)	Fremont Avenue to Inverness Way	The East Channel could provide a neighborhood route to Stocklmeir Elementary and Ortega Park.
k)	Inverness Way to Homestead Road	The East Channel runs underground on this segment except for a short stretch at Stelling. Homestead Road can be reached from Inverness Way via Goldfinch Way/ Londonderry Drive/Heron Avenue or Mariani Drive/Langport Drive.

CALABAZAS CREEK

Connections to Patrick Henry Drive

The Calabazas Creek Trail uses the creek's east levee between Wildwood Avenue and Tasman Drive. Just to the east is a large office park in the City of Santa Clara along Patrick Henry Drive and Old Ironsides Drive, both of which have signalized crossings of Tasman Drive and the Light Rail line. Yahoo! is assembling parcels for a headquarters campus in this area.

A direct path connection to Patrick Henry Drive near the Greenbelt alignment would eliminate the need for bicycle commuters originating on the Greenbelt to detour to Tasman Drive to reach these workplaces. It would be useful to coordinate with the City of Santa Clara to create such a direct connection and to encourage property owners along the west side of Patrick Henry Drive to provide direct ADA-compliant access from their parking lots to the Trail.

Tasman Drive undercrossing

Plans for the Calabazas Creek Trail include an undercrossing of Tasman Drive that will be usable in low-water conditions (during the dry season, and non-storm periods during the rainy season). This will provide residents south of Tasman Drive with access via Old Mountain View – Alviso Road to the San Tomas Aquino Trail, which connects under Highway 237 to the Bay Trail and Baylands Park, avoiding Lawrence Expressway and its freeway interchange. Old Mountain View – Alviso Road connects via Great America Parkway to a cross-county route that follows the south side of Highway 237 into Milpitas.

STEVENS CREEK TRAIL

As described in Section 1.2, Mountain View's planned extension of the Stevens Creek Trail ("Reach 4") would add a bicycle-pedestrian bridge across the creek at the corner of Dale and Heatherstone Way, reachable from nearby Knickerbocker Drive in Sunnyvale. A future extension ("Reach 5") is envisioned to run along the east side of the creek to a point opposite Bryant Avenue, where a bicycle-pedestrian bridge connect to that street and serve Mountain View High School. That bridge would be near Remington Court in Sunnyvale, near the Bernardo Avenue/Remington Drive intersection. Coordination with City of Mountain View staff would ensure that the connection near Dale Avenue/Heatherstone Way and Bryant Avenue/Remington Court benefit both cities.

Stevens Creek continues south of Remington Court along Sunnyvale's border with Los Altos for approximately 1.5 miles, passing close to West Valley Elementary School before reaching Homestead Road. There is a creek bridge at the neighborhood park adjacent to West Valley Elementary, whose attendance area includes part of Los Altos. The City of Los Altos plans to study implementation of the Stevens Creek Trail along its border with Sunnyvale. Staff coordination could ensure that any resulting design is mutually beneficial to both cities. The east-west bike route that includes The Dalles Avenue and its Highway 85 overcrossing could potentially be extended into Los Altos via Barton Drive and the park path and bridge adjacent to West Valley Elementary.

BAY TRAIL

As described in Section 1.2, it appears likely that the Bay Trail's gap across the Moffett Field runway may be closed with an unpaved trail as part of the South Bay Salt Ponds project. For an all-weather connection that supports commuting as well as recreation, a paved path should be planned, funded and constructed as soon as possible thereafter. Coordination with ABAG's Bay Trail Project, the South Bay Salt Ponds Project, and the City of Mountain View may accelerate this process.

As shown in Figure 1.1, the City of San Jose has plans to extend its paved Guadalupe River Trail along the from I-880 to Gold Street in Alviso, with a bridge across the river at the Trail's northern terminus near Alviso Marina. There is an opportunity to create a Bay-side gap closure of the Bay Trail between that point and existing Bay Trail at the northeast corner of Sunnyvale Baylands Park (yellow arrow in Figure 1.1). This would provide more direct access to Alviso's historic district, the San Francisco Bay National Wildlife Refuge Environmental Education Center, and potential future trail connections between Los Esteros Road and Coyote Creek, which is being developed as a trail by the cities of Milpitas and San Jose. The connection between Sunnyvale Baylands Park and Gold Street in Alviso could be explored with ABAG's Bay Trail Project, the South Bay Salt Ponds Project, and the City of San Jose.

DOWNTOWN BICYCLE ACCESS

As described in Section 2.2 (Land Use Plans and Guidelines), the Downtown Specific Plan outlines several improvements for bicycling in the downtown area:

- Improved connectivity through the area currently occupied by the Mall
- Bike lanes on Iowa Avenue
- Bicycle parking for customers and employees close to businesses in the redeveloped core area
- An opportunity for wider, more shareable outside lanes on Mathilda Avenue between El Camino Real and Washington Avenue

SECONDARY-STREET ("NEIGHBORHOOD") ROUTES AND GUIDE SIGNAGE

In addition to the arterial and collector street routes that appear prominently on the City's Bicycle Map, there are several useful cross-town routes composed of secondary streets (residential streets and minor collectors). These bikeways currently have no route signage, and are apparent only to bicyclists who have a bike map or detailed knowledge of Sunnyvale's street network. Table 3.3 lists several secondary-street routes, and the following section describes the Evelyn-to-Tantau route in detail.

Guide signs with destinations, arrows, and optional distances help current and prospective bicyclists to discover routes they might not find without the City's bicycle map. Simplified bicycle route signs, shown here with Chicago-area destinations, are expected to be added to the 2008 Manual on Uniform Traffic Control Devices (MUTCD). The new series is similar to MUTCD D1 and D2 series signs for motor vehicle routes; the bike symbol informs motorists and bicyclists that the route is preferred for bicycles but not for motor traffic. Like the D1 and D2 series, the new signs can display multiple destination-distance-direction pairs can be compactly displayed without "sign clutter", unlike current "Bike Route" standards.

Figure 3.1:
Proposed MUTCD Bicycle Guide Signs

Table 3.3
Secondary-Street ("Neighborhood") Routes

Route	Streets	Destinations Served
Evelyn to Tantau (N-S)	Spruce, Henderson, Sage Hen, Castleton, Teal, Inverness, Quail	Lawrence Caltrain station, Ponderosa ES, Ponderosa Park, Peterson MS, future Apple Computer campus, Vallco mall
Downtown to Moffett Park/ Bay Trail (N-S)	Sunnyvale Avenue, Maude, Borregas (when US-101 and Hwy 237 bridges are open)	Downtown, Sunnyvale Caltrain Station, Bishop ES, Columbia MS, JWC Greenbelt, Moffett Park, Bay Trail
"Greenbelt-Calbazas"	JWC Greenbelt, Weddell Drive, Calabazas Creek Trail	Orchard Gardens Park, Lakewood ES, Lakewood Park, Fairwood ES, Mission College, Mercado Shopping Center
Downtown-to-Downtown (E-W)	Dana Street (Mountain View), Washington Ave	Downtown Mountain View, Stevens Creek Trail, Vargas ES, Washington Park, Downtown Sunnyvale
South neighborhoods (E-W)	Fallen Leaf Lane (Los Altos), Barton Drive, The Dalles Avenue, Hwy 85 bridge, Hollenbeck, Alberta, Bittern, Lochinvar, Pomeroy (Santa Clara)	West Valley ES, Serra Park, Cupertino MS, Nimitz ES, Ortega Park, Stocklmeir ES, Peterson MS, Raynor Park, continuing to Santa Clara HS and Kaiser Hospital/Medical Center

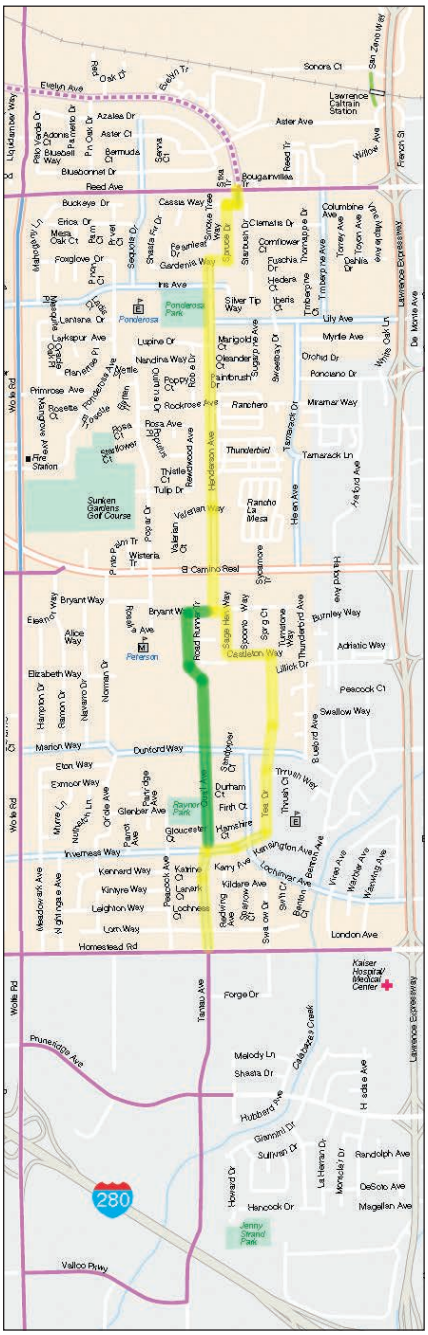
EVELYN-TO-TANTAU ROUTE VIA HENDERSON AND QUAIL

One significant "neighborhood" route runs for two miles through Sunnyvale's residential southeastern corner. It connects the Evelyn Avenue/Reed Avenue signal with the Tantau Avenue/Homestead Road signal at the Cupertino city limit. From north to south, the route follows a path shortcut on the south leg of the Evelyn signal, Spruce Drive, Henderson Avenue, Sage Hen Way, Castleton Way, Teal Drive, Inverness Way, and Quail Avenue. The north and south halves of the route connect across El Camino Real at the Henderson Avenue signal.

This route is a direct but low-traffic alternative to Wolfe Road and Lawrence Expressway, suitable for families and teens. To the north, Evelyn Avenue has bike lanes and connects to Wolfe Road for destinations north of the Caltrain line, and Aster Avenue connects directly to the Lawrence Caltrain station. To the south, Tantau Avenue crosses Pruneridge Avenue, a pleasant east-west route alternative to Homestead Road and Stevens Creek Boulevard through Santa Clara to the Valley Fair and Santana Row shopping centers. The City of Santa Clara bike map shows Pruneridge as an "intermediate" level undesignated route. Apple Computer has purchased the property bounded by Tantau, Pruneridge, Wolfe, and I-280 for its new campus. Tantau continues across I-280 without an interchange, and serves Vallco Shopping Center on Vallco Parkway before crossing Stevens Creek Boulevard and continuing south.

Although this route already exists on streets (yellow highlight), there is an opportunity to improve its directness at Peterson Middle School (green highlight). An informal route is available through the Peterson campus along existing use boundaries, along the east edge of the tennis courts and between the athletic track and the adjacent Santa Clara Unified School District property, directly to the Quail/Dunford intersection. The improved route would continue south on Quail past Raynor Park to the Homestead signal.

Figure 3.2
Evelyn-to-Tantau route



IMPROVING OFFSET CROSSINGS OF COLLECTOR STREETS

Several useful "neighborhood" bicycle route segments cross collector streets at offset intersections, i.e. the street carrying the route forms two closely-spaced offset T-intersections instead of a single 4-way intersection.

Table 3.4
Offset Junctions on Neighborhood Routes

Bicycle Route Street	Collector Street	T-intersection Controls
Britton/San Juan (N-S)	Duane Avenue	1-way stops
Morse Avenue (N-S)	Maude Avenue	1-way stops
Sunnyvale Avenue/Borregas Avenue (N-S)	Maude Avenue	Signals

For the stop-controlled offset junctions, bicycle and pedestrian-activated warning devices could be considered similar to the installation at the intersection of Bayview Avenue and Maude Avenue, a school crossing adjacent to Bishop Elementary School (Bayview is a 4-leg intersection). The Britton/San Juan offset crossing on Duane Avenue could be implemented as a crossing improvement for a future East Channel path.

BICYCLE PARKING AND STORAGE CODE REQUIREMENTS

Sunnyvale's Zoning Code currently sets requirements for bicycle storage at multi-family residential uses. Similar requirements should be added for medium and large workplaces, and for retail, restaurant and entertainment uses.

The Moffett Park Specific Plan sets requirements for workplace bicycle storage as described in Table 2.2. These could be reviewed and adapted for incorporation in the Zoning Code. The zoning codes of some other Bay Area cities such as Palo Alto and Mountain View address bicycle parking requirements for commercial sites and other land uses. They cover both short-term parking (bicycle racks) for customers and visitors, and all-day storage (bicycle lockers or "shared-secure" bicycle enclosures) for employees. In some codes, the requirements are based on a percentage of the auto parking requirement for each land use type.

3.2 Capital Improvement Program Options

SPEED MANAGEMENT BIKEWAY MEASURE

Many residential streets are 40' or less in width and have all-day parking demand such that parking removal and daytime parking restrictions are considered infeasible. 40' is too narrow for two travel lanes plus minimum-width (12') bike+parking lanes. The 1998 Bicycle Opportunities Study recommended striping a bike+parking shoulder on such streets, but a bicyclist who rode within such a striped area would be in the door zone next to parked cars. Bike lanes are appropriate treatments where motor traffic speeds and volumes are high enough that overtaking occurs frequently and rapidly, which should not be the case on low-volume residential streets.

The most important bicycle accommodation factor on low volume residential streets is maintaining moderate motor vehicle speeds so that cyclists are not intimidated and passing can occur at reasonable overtaking speeds. For this reason, this Plan replaces the "bike+parking shoulder" approach with a "Speed Management" treatment, which can be implemented by traffic calming. Sunnyvale's current policy considers only residential streets are eligible for traffic calming, but Speed Management on bikeway corridors may involve calming residential-collector or collector-collector intersections, possibly with neighborhood traffic circles or other intersection calming treatments.

BICYCLE BOULEVARD BIKEWAY MEASURE

A "Bicycle Boulevard" treatment transforms a low-volume residential or local street into a bicycle throughway that is not also a motor vehicle throughway, while preserving motor vehicle access to every property along the street. This is accomplished by the application of several techniques:

- Turning of most stop signs onto cross streets, to enable non-stop travel on the "boulevard" street, raising average bicycle speeds and reducing bicycle travel times. Major 4-way stops are retained.
- Addition of traffic calming or motor vehicle through movement and turning restrictions as needed, to prevent the street from becoming a motor traffic throughway.
- Connection of the street across arterials and major collector streets using signals where needed.
- Providing only nonmotorized passage over, under, or through barriers such as creeks, railways, or major intersections, to divide the corridor into segments that support only local access by motor vehicles.

An ideal candidate street for bicycle boulevard treatment runs parallel to a nearby arterial or major collector street that is favored by motorists, serves the same origins and destinations as the major street, and can be connected across any major streets that it crosses. Palo Alto's Bryant Street Bicycle Boulevard, a nearby example, extends over three miles between southern Palo Alto and the Menlo Park border parallel to Alma Street, an arterial with narrow outside lanes. It has few stop signs along its length but deters long-distance through travel by motor vehicles with a creek bridge that admits only bicycles and walkers, two street closures, a neighborhood traffic circle, and turn restrictions at an arterial signal.

3.3 Bicycle Parking

COMMERCIAL

Throughout Sunnyvale, the provision and quality of bicycle racks for customers at businesses is uneven. At some locations, there is no place to lock a bike although demand is apparent because bicycles are locked to trees, signposts, pipes, and other available objects. At other businesses, racks are provided but their obsolete design does not allow the use of a modern "U-lock" to secure the bike's frame, leaving cable-locked bikes vulnerable to thieves with simple tools. Even where the rack type supports U-locking, some racks obstruct successfully parking, or position parked bikes to obstruct pedestrian travel or risk damage from vehicle movements.

A "visual guide" handout can illustrate recommended and prohibited bike rack types along with the security and usability factors associated with each design. This flyer should be provided to developers and contractors, and used in the development review and approval process. Appendix E is an example of such a guide.

Figure 3.3
Bicycle racks at Sunnyvale commercial destinations

a) Inverted-U: secure, convenient

b) "Loop rack": convenient, can't U-lock

c) Parking demand, no rack provided

d) U-lock-capable rack, siting prevents use

TRANSIT

SECURE BICYCLE STORAGE

According to rental statistics, both Caltrain stations currently have sufficient long-term bicycle storage capacity. The same is not currently true for the two Light Rail stations that have bike lockers – Lockheed-Martin and Fair Oaks. VTA should be encouraged to add bike locker capacity at these stations to meet the evident demand.

Until recently, the provision of "day-use" bicycle lockers has been hampered by a lack of effective locking technology. Locker doors with hasps designed for "hardware store" padlocks enable anyone to use the storage indefinitely, whether or not they are storing a bicycle, and simple padlocks can be cut with easily-concealed bolt cutters. Smart locks with card or fob access have now become available, allowing the managing agency to require identification before granting access, and to selectively revoke access if a locker is misused. Bike locker vendors are currently developing "remote reservation" systems whereby a locker at a given location can be held with an online or cell-phone transaction, enabling bicyclists to ensure that secure storage will be available whenever they arrive. City staff should track the development of this technology for use at transit stations.

The Moffett Park LRT station is the first station in Sunnyvale for passengers arriving from the Mountain View intermodal station. Although a substantial number of bicycle lockers are located adjacent to the station, they are owned by Ariba Incorporated and used by bike-to-work commuters of that company and other employers in its building complex.

It would be valuable for VTA to provide bike lockers at the Moffett Park station to store the work-end bicycles of commuters who arrive on Light Rail from the downtown Mountain View station without a bicycle. There is ample space in the parking lot near Ariba's lockers to add lockers for transit patrons. Although eastbound Light Rail passengers could remain aboard one more stop to use the bike lockers at the Lockheed Martin Transit Center, shortening their total travel times by several minutes in the morning and afternoon could make transit+bike commutes viable for some employees.

BICYCLE RACKS

Some bicyclists ride low-value bicycles that are relatively unattractive to thieves, especially if not left unattended overnight. Providing bicycle racks at rail transit stations and at major bus stops can enable bike-to-transit trips for such users.

3.4 Education and Encouragement

Sunnyvale has good bicycle driver education programs in place at its public schools. The middle school pilot program is notable because it includes on-bike practice. These programs should become a permanent component of the school year, possibly integrated into the physical education curriculum. Children who learn how to operate a bicycle safely and confidently on the street network for transportation as well as recreation gain a lifelong tool for fitness, health, and weight management – currently a major concern throughout the U.S.

A comparable program for adults is not yet in place. Nearby cities periodically offer classes suitable for adults and older teens several times a year, and the Bay Area is home to several active League of American Bicyclists certified Cycling Instructors, known as LCIs, equipped with PowerPoint-based curriculum. Classes could be offered through the City's recreation program or independently. The City could make facilitate the offering of adult bicycle driver education classes through in-kind provision of a classroom or conference room for holding the lecture-and-discussion sessions.

4 Goals, Policies, and Action Statements

STATEMENT OF PURPOSE

Sunnyvale shall encourage the use of bicycles for transportation and recreation, to minimize air pollution, reduce energy consumption and traffic congestion, and to improve the health and fitness of citizens of all ages.

OBJECTIVES

1. Enhance Sunnyvale's livability by supporting bicycling through planning, engineering, education, encouragement, and enforcement.
2. Ensure that a bicyclist of average ability can travel safely on all Sunnyvale streets, and can reach any Sunnyvale destination by a reasonably direct route.
3. Support bicycling as a travel mode on an equal basis with motorized mobility options.

The Objectives of Sunnyvale's bicycle transportation program will be achieved through improvements to the "Four 'E's": Engineering, Education, Enforcement, and Encouragement, guided by the following Goals, Policies, and Action Statements. Facility improvements will be the major focus because without them education, encouragement, and enforcement will not suffice.

The Land Use and Transportation Element (LUTE) of Sunnyvale's 1997 General Plan contains several Action Statements that address bicycling.

Table 4.1
1997 General Plan Land Use & Transportation Element Action Statements related to bicycling

R1.9.1	Support state and regional efforts to provide High Occupant Vehicle (HOV) lanes, ridesharing, mass transit service, bicycling, and Intelligent Transportation Systems.
C3.3.5	Make the traffic signal system responsive to all users, including bicyclists and pedestrians.
C3.5.4	Maximize the provision of bicycle and pedestrian facilities.
C3.5.5	Implement the City of Sunnyvale Bicycle Plan.
C3.5.7	Ensure safe and efficient pedestrian and bicycle connections to neighborhood transit stops.
N1.3.2	Study the adequacy/deficiency of bicycle and pedestrian access and circulation within neighborhoods.
N1.3.3	Design streets, pedestrian paths, and bicycle paths to link neighborhoods with services.
N1.10.2	Encourage commercial enterprises and offices to provide support facilities for bicycles and pedestrians.
N1.13.5	Provide pedestrian and bicycling opportunities to neighborhood commercial services.
N1.14.2	Ensure the provision of bicycle support facilities at all major public use locations.

The Bicycle Plan's Goals, Policies and Action Statements appear on the following pages. Items corresponding to LUTE Action Statements are followed by references in brackets, for example [R1.9.1].

Goal BP.A

Provide a bikeway network that supports bicycle trips to work, school, shopping, and for recreation.

Policy BP.A1	**Facilitate safe, efficient and convenient access of bicyclists to transit.**
Action BP.A1.a	Ensure that the City's bikeway network supports feeder trips to rail stations and bus stops. [C3.5.7]
Action BP.A1.b	Work with Caltrain and VTA staff to ensure that adequate secure bicycle storage capacity is provided to meet demand at rail transit stations and bus transfer stations. [N1.14.2]
Action BP.A1.c	Encourage transit agencies to continue to explore ways to increase on-board bicycle capacity to meet demand.
Policy BP.A2	**Facilitate safe, efficient and convenient access of student bicyclists to schools.**
Action BP.A2.a	Ensure that the City's bikeway network supports student trips to elementary, middle, and high schools, including safe street crossings at schools, minimization of bicycle-vehicle conflicts on and near school grounds, and corner curb cuts on sidewalk segments used by young bicyclists riding to and from schools.
Action BP.A2.b	Work with school and school district staff to position student bicycle parking conveniently relative to bike-to-school routes.
Action BP.A2.c	Pursue Safe Routes To Schools (SR2S) funding for bikeway improvement projects.
Policy BP.A3	**Expand Sunnyvale's network of off-street bicycle paths for recreation and utility cycling by facilitating bicycle access to the Baylands and along flood control channels.**
Action BP.A3.a	Evaluate the feasibility of developing the West Channel as a pathway throughout the Moffett Park area, including a connection to the Bay Trail.
Action BP.A3.b	Evaluate the feasibility of developing the East Channel as a pathway throughout the City. [N1.3.3]
Action BP.A3.c	Evaluate the feasibility of connecting the Calabazas Creek path across Highway 237 and Tasman Drive.
Action BP.A3.d	Facilitate discussion between agencies involved with the Bay Trail to select and discuss alignments and amenities for segments within and adjacent to Sunnyvale.
Action BP.A3.e	Provide a paved surface on Sunnyvale's Bay Trail mainline segment.
Action BP.A3.f:	Work with the ABAG Bay Trail Project, U.S. Fish and Wildlife Service, NASA, and the City of Mountain View to encourage the provision of a paved trail between the Stevens Creek Trail and Sunnyvale's Bay Trail segments.
Action BP.A3.g	Work with the ABAG Bay Trail Project to encourage the provision of a paved trail segment between the north end of Calabazas Creek and the future north terminus of the Guadalupe River Trail at Gold Street in Alviso.
Action BP.A3.h	Coordinate with the City of Mountain View on the design of connections to Sunnyvale streets from its segments of the Stevens Creek Trail south of El Camino.
Policy BP.A4	**Facilitate bicycle access to and through Downtown.**
Action BP.A4.a	Provide customer bicycle parking near customer entrances of businesses in the redeveloped Downtown.
Action BP.A4.b	Provide employee bicycle storage near employee entrances of businesses in the redeveloped Downtown.
Policy BP.A5	**Facilitate bicycling to workplaces.**
Action BP.A5.a	Encourage business owners to provide bicycle commuter amenities (secure bicycle storage, clothing storage, changing facilities, and showers).

Goal BP.B

Create and follow transportation planning, funding, design, construction and maintenance practices that support bicycling.

Policy BP.B1	Facilitate bicycling through the City's transportation planning process.
Action BP.B1.a	Maintain an updated Bicycle Capital Improvements Projects (CIP) list.
Action BP.B1.b	Periodically update the City's bicycle plan, coordinating it with the Countywide plan and the plans of neighboring jurisdictions.
Action BP.B1.c	Consider Zoning Code changes to require bicycle parking and storage facilities at commercial, residential, office, industrial, and public land uses in accordance with VTA Bicycle Technical Guidelines and VTA Community Design and Transportation Program. [N1.10.2]
Action BP.B1.d	Ensure that non-automated traffic counts conducted as part of any City transportation or development study count bicycles at the same locations where motor vehicles are counted.
Action BP.B1.e	Consider development of an annual bicycle screen-line count in order to provide bicycle volume data needed for computing bicycle collision rates.
Action BP.B1.f	When mitigating and intersection for Level of Service deficiency, consider bicyclists needs and safety.
Policy BP.B2	Accommodate bicycling needs in future roadway and land development projects.
Action BP.B2.a	Provide for bicyclists as part of roadway resurfacing and maintenance, road widenings, new developments, and property redevelopment. Notify City Council if providing for bicycles appears to be infeasible. [C3.5.4]
Action BP.B2.b	Continue to install and mark traffic signal detection that is sensitive to bicycles in future and retrofitted roadway and bike lane projects where appropriate. [C3.3.5]
Action BP.B2.c	Continue the program of making bicycle racks available to commercial property owners. [N1.10.2]
Action BP.B2.d	When mitigating motor vehicle Level Of Service (LOS), consider impacts on bicycle and pedestrian accommodation.
Policy BP.B3	Pursue all available funding options for bicycle facility construction and improvements. [C3.5.4]
Action BP.B3.a	Using the Capital Improvements Projects list as a guide, develop proposals for TDA Article 3 and other applicable funding sources.
Action BP.B3.b	Pursue all other possible funding sources for design, construction, and maintenance of bicycle facilities.
Policy BP.B4	Ensure that the City's new and existing bikeways conform to the latest county, regional, state and federal design standards and guidance.
Action BP.B4.a	Design and maintain the City's bikeways and shared roadway facilities to standards contained in the most recent Manual on Uniform Traffic Control Devices and state MUTCD Supplement, Caltrans Standard Plans, and VTA Bicycle Technical Guidelines.
Action BP.B4.b	Consider bicycle route signage on routes through neighborhoods, incorporating destination names and directional arrows, and also distances where appropriate.
Policy BP.B5	Maintain roadways and bikeways suitable for bicycle use.
Action BP.B5.a	Correct obstructions to bicycles on the City's roadway system through on-going maintenance programs.
Action BP.B5.b	Budget for operation and maintenance of bicycle facilities.
Action BP.B5.c	Continue sweeping all roadways at least monthly, or more frequently as needed to keep bicycle travel areas free of glass, thorns, and debris.
Action BP.B5.d	Consider a program to sweep bike lanes and key routes more frequently than once per month.
Action BP.B5.e	Work with Public Safety and contractors to institutionalize the practice of removing collision debris from the entire roadway including the bicycle travel area.
Action BP.B5.f	Maintain striping and pavement markings, including detector markings, to ensure continued legibility.

Policy BP.B6	Use bicyclist safety data, counts, and analysis to inform engineering, enforcement, and education.
Action BP.B6.a	At least annually, review bicycle-involved collision records for patterns including location, age, movement, fault, and collision factors.
Policy BP.B7	Support county, regional, state, and federal policy that supports bicycling. [R1.9.1]
Action BP.B7.a	Support efforts to establish stable levels of funding for bicycle projects and programs at the county, regional, state and federal level.
Action BP.B7.b	Support bicycle-friendly transportation policy at all levels of government including the California Department of Transportation.

Goal BP.C

Educate bicyclists and motorists as to their rights and responsibilities, and encourage bicycling as a first-class travel mode

Policy BP.C1	Continue to provide and improve the bicycle driver education program for elementary school students.
Action BP.C1.a	Continue and expand bicycling education by Public Safety and other providers in elementary school classrooms and assemblies.
Action BP.C1.b	Continue providing bicycle rodeos, including stations to teach traffic cycling skills to children who have sufficient bicycle handling skills.
Action BP.C1.c	Explore the possibility of providing on-bike training at elementary schools.
Policy BP.C2	Continue to provide and improve the bicycle driver education program for middle school students.
Action BP.C2.a	Provide a permanent bicycle driver education program for middle school students, such as the Traffic Safe Communities Network "Drive Your Bike" pilot program.
Action BP.C2.b	Encourage the establishment of a bicycling orientation program for new middle school students, including escorted training rides on home-to-school routes.
Policy BP.C3	Continue to provide and improve the bicycle driver education program for adults and high school-age teens.
Action BP.C3.a	Offer and promote a League of American Bicyclists "Road One" adult bicycle driver education class within the City at least annually, through the Recreation Program or other channels. (Note: Road One classes are taught by certified League Cycling Instructors; an LCI directory is available on the L.A.B. website.)
Policy BP.C4	Provide bicycling information for the public.
Action BP.C4.a	Periodically publish a Bicycle Map showing bike paths, routes and lanes and their suitability ratings.
Action BP.C4.b	Periodically update the City's bicycling webpage with new and improved bicycle driver education resources including links to directories of classes available locally, and contacts for reporting roadway problems including non-functional detectors.
Action BP.C4.c	Consider improving the effectiveness of the education component by providing materials for non-English speakers.
Policy BP.C5	Educate motorists about the rights, responsibilities, and needs of bicyclists.
Action BP.C5.a	Study methods, including traffic school, for educating motorists about rights and responsibilities on the road.
Policy BP.C6	Support the "institutionalization" of bicycle driver education programs.
Action BP.C6.a	Support efforts to establish ongoing funding for bicycle driver education and motorist education programs at the county, regional, state and federal level.
Action BP.C6.b	Pursue available funding options for bicycle driver education programs.

Goal BP.D

Provide for enforcement regarding the rights and responsibilities of cyclists and motorists

Policy BP.D1	Provide enforcement related to the rights and responsibilities of bicyclists.
Action BP.D1.a	Encourage Public Safety officers to cite violations by bicyclists or motorists in a manner that will promote greater education and safety, and promote bicyclist-motorist coexistence. Provide the Public Safety Department with educational materials to enable this.
Action BP.D1.b	Enforce prohibitions against parking in bike lanes.
Action BP.D1.c	Continue the Public Safety Department's Juvenile Bicycle Diversion classes.
Policy BP.D2	Ensure that Public Safety officers are knowledgeable about bicyclist rights, responsibilities, and needs.
Action BP.D2.a	Continue ongoing contacts and information exchange between the Bicycle-Pedestrian Advisory Committee and the Public Safety Department on enforcement and education issues and opportunities.
Action BP.D2.b	Encourage the Public Safety Department to adopt or adapt the Massachusetts Bicycle Coalition's "Law Officer's Guide to Bicycle Safety", a self-paced presentation with video clips, or the equivalent NHTSA program expected to be released in 2006.
Action BP.D2.c	If appropriate, encourage the Public Safety Department to always have at least one officer on active duty who has successfully completed the League of American Bicyclists "Road One" class or an equivalent Police Cyclist class incorporating on-bicycle training

5 Bicycle Capital Improvement Program (CIP)

5.1 Bicycle accommodation on streets

Safe and effective on-street bicycle accommodation includes the availability of adequate travel width – including clearance from the doors of parked cars - and a comfortable environment for passing of bicycles by motor vehicles. Bicycle accommodation can take several forms depending on the nature of the facility; all of the following types are present in Sunnyvale:

Table 5.1
Bicycle Accommodation Options

Accommodation Type	Description
Separated	Paved path independent of the roadway
Exclusive (striped) bicycle travel area	Bike lane or striped shoulder
Wide outside lane	Wide enough to be passed comfortably within the lane; 14′ minimum without parking, 22′ minimum with parking. May optionally be delineated with Shared Lane Markings to indicate where bicyclists should travel to stay clear of the doors of parked cars.
Low volume, low-speed street	Oncoming volume sufficiently low that passing can occur using the full width of the street. Low-volume streets typically have no lane lines; a centerline may be dashed or absent. May be an ordinary residential street or a low-volume street with speed management or Bicycle Boulevard treatments applied.
Narrow outside lane	Passing of bicycles by motor vehicles cannot occur safely within the lane. May optionally be delineated with Shared Lane Markings to indicate that motorists should use the adjacent lane to pass.

The purpose of the Bicycle Capital Improvement Program (CIP) is to specify a final layout for each arterial and collector street, and to identify the improvements needed to implement the desired layout. A street's layout includes its lane count, lane widths, and parking conditions. The appropriate accommodation type and street layout depends on a given street segment's existing width, intersection layout including signalization, lane layout, traffic volume, traffic speed, parking demand, and adjacent land use.

5.2 Overview of CIP

The 2000 Long-Range Bicycle Capital Improvement Program Study established a comprehensive bikeway network composed of major street segments, and described the improvements needed to improve each segment for bicycling, typically by adding bike lanes. The CIP does not include paths and trails, bicycle parking and storage, signs, on-street links to the Stevens Creek Trail, and non-capital items such as education.

CIP segments were scored using a set of variables including rider stress (due to narrow lanes), collision history, traffic volume, gap closure, cost and cost-effectiveness, connectivity, and implementation complexity. Many of the segments that were recommended for re-striping to add bike lanes have been implemented. This Plan updates the CIP by removing completed projects, modifying and adding several projects, and updating the ranking and cost estimates.

5.3 Toolkit

The 2000 CIP study defined a toolkit of bicycle facility improvement types and identified the most likely type for each roadway segment in the City. This Plan updates the toolkit by adding:

- A "parking pockets" variation of minor widening
- A "speed management" option for low volume residential collector streets where parking removal or substandard-width striped bicycle-and-parking lanes were previously recommended
- A "Bicycle Boulevard" enhancement of speed management.

Appendix A contains a detailed description of the updated toolkit.

Table 5.2
Toolkit of roadway improvement options

Tools for adding bike lanes		
1	**Re-striping (without parking reduction)**	
	a) Without travel lane removal	
	b) Removal of a travel lane, and possible addition of a center turn lane where none existed	Considered where vehicles per lane per peak hour is sufficiently low. Adding a center-turn lane creates opportunities for median refuges that improve the safety and convenience of pedestrian crossings.
2	Parking modifications	
	a) Parking removal, both sides	Choice depends on land use (residential or commercial), occupancy, turnover, and time-of-day patterns, and the availability of off-street or side-street parking
	b) Parking removal, one side	
	c) Time-restricted parking	
3	Widening	
	a) Parking pockets	Where a landscape strip is present, creating indentations for parking to avoid widening entire blocks
	b) Minor widening	Not requiring utility relocation or property acquisition
	c) Major widening	Requiring utility relocation or property acquisition
Tools for streets without bike lanes		
4	Shared Lane Marking	Considered where bike lanes are desirable but lane removal, parking modifications and widening are impractical
5	Speed management	For low-volume residential streets where cyclists can be comfortably passed using the full street width
	a) Without traffic control changes	
	b) "Bicycle Boulevard" treatment	Speed management combined with traffic control changes to reduce the number of locations at which a bicyclist must stop.

5.4 Proposed Capital Improvement Program (CIP)

Table 5.4, the CIP Table, lists all projects in the updated Bicycle Capital Improvement Program in decreasing order of score. The CIP Table uses abbreviations to indicate the existing and proposed layout for each side of each street segment, and the implementation action needed to produce the proposed layout. The following table describes the CIP Table columns and the abbreviations they contain:

Table 5.3
Key to CIP Table

Column	Description		
CIP Segment			
Corridor	Corridor number (1-30) and segment number within that corridor		
Street	Name of street		
Extents	Endpoints of segment (cross streets or other features)		
Feet	Length of segment in feet		
Layout			
Existing	Existing lane and parking configuration on both sides of segment:		
	Left side	**Right side**	**Description**
	B-	-B	Bike Lane, no parking
	BP-	-BP	Bike Lane with parking
	DB-	-DB	Daytime bike lane (evening parking)
	N-	-N	Narrow outside lane, no parking allowed
	PN-	-PN	Parking lane and narrow outside travel lane
	S-	-S	Shared Lane Marking
	SS-	-SS	Shoulder stripe (functions as bike lane)
	W-	-W	Wide outside lane, no parking allowed
	WP-	-WP	Wide outside lane with parking allowed
Proposed	Proposed lane and parking configuration on both sides of segment (same abbreviations as Existing)		
Improvement			
Action	Change required to implement Proposed layout:		
	Action	**Description**	
	R	Restriping without travel lane removal	
	T	Restriping with travel lane removal	
	S	Shared Lane Marking	
	SM	Speed Management or Bicycle Boulevard	
	W	Widening (major, minor, or "parking pockets")	
Cost ($K)	Estimated cost of Action		
Score	Calculated priority value based on CIP scoring and ranking factors		

The figures following the CIP Table show the streets that would be affected by each implementation action. Figure 5.7 summarizes all proposed changes.

Figure	Descriptions	Action
5.1	Proposed restriping, no travel lane removal	R
5.2	Proposed travel lane removal	T
5.3	Proposed parking changes (removal, or weekday daytime restrictions)	—
5.4	Proposed Shared Lane Marking	S
5.5	Proposed Speed Management	SM
5.6	Proposed Widening	W
5.7	Summary of proposed changes	(All)

Several proposed CIP projects involve roadway segments controlled by other agencies. Caltrans controls El Camino Real (State Route 82), US-101, Highways 85 and 237, and all interchanges of those roadways. Santa Clara County's Department of Roads and Airports owns and operates Central Expressway and Lawrence Expressway. The jurisdiction of these agencies typically extends to the signals adjacent to each interchange, or to the back of the curb return (corner curvature) at signals.

Table 5.4

Proposed Capital Improvement Program - Projects and Priority

This table continues on two additional pages. Total cost appears on the last page.

CIP Segment					Layout		Improvement		
Corridor		Street	Extents	Feet	Existing	Proposed	Action	Cost ($K)	Score
7	1	El Camino	City Limit – City Limit	19,875	WP–WP	B–B	R	440.53	2.18
9	1	Fair Oaks	Crossman – Fair Oaks Way	1,625	W–W	B–B	R	25.94	2.17
9	2	Fair Oaks	Fair Oaks Way – Weddell	2,437	N–W	B–B	R	38.91	2.17
27	9	Tasman	Lawrence – City Limit	2,843	N–N	N–N	S	1.32	2.15
27	8	Tasman	Fair Oaks – Lawrence	4,007	W–N	B–B	T	39.13	2.00
28	3	Java	Mathilda – Crossman	4,750	W–W	W–W	S	2.21	2.00
21	3	Wolfe	Maria – Fremont	1,422	S–S	B–B	W	0.66	1.93
9	3	Fair Oaks	Weddell – Ahwanee (US–101)	2,000	W–W	B–B	R	19.53	1.93
27	7	Wildwood	Bridgewood – City Limit	3,125	W–WP	B–B	R	30.52	1.92
27	3	Weddell	Morse – Bike Path	1,350	N–W	B–B	R	13.18	1.90
16	2	Mary	Maude – Central Expwy	2,500	W–W	W–W	R	8.91	1.82
3	4	Bernardo	Remington – Fremont	2,725	WP–WP	DB–BP	R	26.61	1.80
29	6	Potrero	Maude – Central	2,225	WP–WP	WP–WP	SM	1.03	1.80
6	2	Duane	Fair Oaks – Duane Ct	4,600	WP–WP	BP–BP	T	73.44	1.78
12	2	Hollenbeck	Danforth – Fremont	5,280	PN–NP	DB–BP	R	18.82	1.77
27	6	Sandia	Lawrence – Blazingwood	250	WP–WP	B–B	R	1.28	1.75
27	12	Sandia	Blazingwood – Wildwood	4,000	WP–WP	BP–DB	R	20.46	1.75
29	2	Pastoria	Sutter – Olive	800	NP–WP	BP–B	R	7.81	1.75
12	3	Hollenbeck	Fremont – Alberta	3,300	PN–NP	DB–BP	R	11.76	1.72
6	3	Duane	Duane Ct – Lawrence	1,250	N–N	B–B	R	25.77	1.72
11	1	Hendy	Sunnyvale – Kifer	2,900	N–W		R	37.31	1.70
3	5	Bernardo	Fremont – Homestead	5,300	N–NP	W–DW	R	43.54	1.67
3	1	Bernardo	Evelyn – Ayala	600	W–W	BP–BP	R	6.79	1.65
2	1	Belleville	Fremont – Homestead	5,300	PN–NP	WP–WP	S	51.75	1.63
19	1	Remington	Mary– SunnySara	5,280	WP–WP	BP–BP	T	100.66	1.63
28	2	Bordeaux	Mathilda – Moffett Park	4,950	WP–WP	B–BP	R	40.66	1.63
16	6	Mary	El Camino – Fremont	7,311	WP–WP	DB–BP	R	116.72	1.62
16	7	Mary	Fremont – Cascade	1,625	N–W	B–B	R	36.02	1.62
30	3	Henderson	Iris – El Camino	3,950	WP–PW	BP–DB	R	26.33	1.60
5	2	California	Pastoria – Sobrante	570	N–W	Wider BL	R	7.33	1.60
5	3	California	Sobrante – Mathilda	650	N–N	B–B	R	6.35	1.60
9	6	Fair Oaks	Arques – Calif (Central Ex)	820	N–W	B–B	R	18.18	1.60
9	7	Fair Oaks	California – Birch	490	W–N	B–B	R	7.82	1.60
9	8	Fair Oaks	Birch – Kifer	410	W–W	B–B	R	6.55	1.60
27	1	Weddell	Ross – Orchard Park	1,350	N–WP	W–WP	R	9.00	1.60

CIP Segment					Layout		Improvement		
Corridor		Street	Extents	Feet	Existing	Proposed	Action	Cost ($K)	Score
27	2	Weddell	Orchard Park – Morse	2,275	N–WP	W–WP	R	15.16	1.60
29	4	Del Rey	Pastoria – Mathilda	1,575	WP–WP	WP–WP	SM	0.73	1.60
24	1	Alberta	Hollenbeck – SunnySara	2,650	WP–WP	DB–BP	R	17.66	1.57
6	1	Duane	Pine – Fair Oaks	4,300	WP–WP	WP–WP	SM	2.00	1.55
14	6	Iowa	Mathilda – Sunnyvale	1,550	PN–NP	BP–B	R	15.14	1.55
14	8	Olive	Bernardo – Mathilda	5,930	WP–PW	WP–PW	SM	2.76	1.55
14	9	Olive	Mathilda – Fair Oaks	2,400	WP–W	WP–W	SM	1.12	1.55
26	5	Marion	Wolfe – Dunford	1,200	WP–WP	WP–WP	SM	0.56	1.55
29	5	Pastoria	Almanor – Hermosa	4,000	WP–WP	WP–WP	S	1.86	1.55
24	3	The Dalles	Bernardo – Hollenbeck	5,275	WP–WP	DB–BP	R	35.16	1.53
26	3	Inverness	Bittern – Lochinvar	7,850	WP–WP	DB–BP	R	52.32	1.53
14	3	Washington	Mathilda – Sunnyvale	1,525	N–NP	W–WP	R	14.89	1.53
16	3	Mary	Central Expwy – Evelyn	1,400	N–W	B–B	R	35.37	1.53
16	5	Mary	Evelyn – El Camino	4,225	WP–WP	BP–DB	R	67.45	1.52
1	3	Maude	Pastoria – Mathilda	1,015	W–W	B–B	R	22.50	1.50
5	1	California	Mary – Pastoria	2,275	WP–WP	WP–WP	S	1.06	1.50
5	4	California	Mathilda – Sunnyvale	1,625	WP–WP	DB–W	R	13.35	1.50
5	5	California	Sunnyvale – Jackson	500	WP–WP	BP–B	R	4.11	1.50
5	6	California	Jackson – Roosevelt	1,140	WP–WP	B–BP	R	9.3	1.50
5	7	California	Roosevelt – Fair Oaks	1,000	WP–WP	B–B	R	8.22	1.50
23	6	Michaelangelo	Court – Crescent	900	WP–WP	B–BP	R	6.00	1.48
22	7	Santa Ynez	Ahwanee – Duane	1,200	WP–WP	WP–WP	SM	0.56	1.47
26	2	Bittern	Harwick – Inverness	675	WP–WP	WP–WP	SM	0.31	1.47
26	4	Dunford	Marion – Benton	3,375	WP–WP	BP–B	R	38.19	1.47
4	7	Morse	Greenbelt – Weddell	320	WP–WP	BP–B	R	4.12	1.45
4	8	Morse	Ahwanee – Maude	3,600	WP–WP	WP–WP	SM	1.67	1.45
14	4	Washington	Sunnyvale – Bayview	840	WP–WP	WP–WP	SM	0.39	1.45
9	5	Fair Oaks	Maude – Arques	1,375	PN–NP	DB–DB	R	21.95	1.45
30	1	Gail	Old SF – Linden	3,150	WP–PW	WP–PW	SM	1.46	1.45
30	2	Helen	Tamarack – El Camino	1,525	WP–PW	WP–PW	SM	0.71	1.45
14	1	Washington	W. City Limit – Bernardo	960	WP–PW	WP–PW	SM	0.45	1.43
14	2	Washington	Bernardo – Mathilda	5,925	PN–NP	DB–BP	R	21.12	1.43
30	8	Sequoia	Azalea – Iris	2,400	WP–WP	WP–WP	SM	1.12	1.42
30	10	Timberpine	Reed – Timberpine Ct	1,375	WP–WP	WP–WP	SM	0.64	1.42
3	2	Bernardo	Ayala – El Camino Real	3,800	WP–WP	DB–BP	R	135.96	1.42
14	5	Iowa	Bernardo – Mathilda	5,875	WP–WP	WP–WP	SM	57.37	1.42
23	3	Manet	Crescent – Fremont	1,325	WP–PW	WP–PW	SM	0.62	1.42
4	2	Crossman	Java – Moffett Park	650	N–W	B–B	R	10.38	1.40

CIP Segment					Layout		Improvement		
Corridor		Street	Extents	Feet	Existing	Proposed	Action	Cost ($K)	Score
30	7	Linden	Gail – Maria	975	WP–WP	WP–WP	SM	0.45	1.40
21	2	Wolfe	Old SF – Maria	3,800	SLM–SLM	SLM–SLM	W	1,739.32	1.37
4	9	Morse	Maude – California	2,250	WP–WP	WP–WP	SM	1.05	1.35
23	5	Picasso	Crescent – Fremont	1,200	WP–W	WP–W	SM	0.56	1.35
27	5	Lakehaven	(Street end) – Silverlake	2,800	WP–WP	WP–WP	SM	16.86	1.35
27	10	Lakehaven	Silverlake – Twinlake	500	WP–WP	BP–DB	R	3.01	1.35
27	11	Lakehaven	Twinlake – Lawrence	300	WP–WP	B–B	R	1.81	1.35
30	4	Iris	Fair Oaks – Henderson	5,750	WP–PW	WP–PW	SM	2.67	1.35
30	6	Lily	Timberpine – White Oak	900	W–W	BP–BP	SM	0.42	1.35
30	12	White Oak	Lily – Poinciana	850	WP–WP	WP–WP	SM	0.40	1.35
22	5	Amador	San Miguel – Santa Ynez	2,700	WP–WP	WP–WP	SM	1.26	1.33
22	6	San Rafael	Ahwanee – Duane	1,600	WP–WP	WP–WP	SM	0.74	1.33
24	2	Cascade	Bernardo – Yukon	7,850	WP–WP	WP–WP	SM	3.65	1.33
26	8	Lochinvar	Inverness – Lawrence	2,750	WP–WP	WP–WP	SM	1.28	1.33
20	1	Sunnyvale	Maude – Arques	1,650	WP–WP	BP–DB	R	11.00	1.32
26	1	Harwick	SunnySara – Bittern	600	WP–WP	WP–WP	SM	0.28	1.32
30	5	Lily	Henderson – Timberpine	1,500	WP–PW	BP–DB	R	7.67	1.32
4	4	Borregas	Persian – Weddell	2,250	PW–WP	BP–DB	R	8.02	1.30
26	7	Lochinvar	Dunford – Inverness	1,218	WP–WP	WP–WP	SM	0.57	1.30
30	9	Tamarack	Lily – Helen	1,950	WP–WP	WP–WP	SM	0.91	1.30
9	4	Fair Oaks	Ahwanee – Maude	3,200	N–N	B–B	W	1,703.59	1.30
15	2	Knickerbocker	Mango – Hollenbeck	3,525	PN–NP	DB–BP	R	12.57	1.27
26	6	Quail	Dunford – Homestead	2,775	WP–WP	WP–WP	SM	1.29	1.27
20	2	Sunnyvale	Arques – Evelyn	2,375	WP–WP	DB–DB	R	23.19	1.25
22	2	Almanor	Vaqueros – Mathilda (curve)	650	W–W	B–B	W	59.24	1.23
23	1	Crescent	SunnySara– Picasso	2,200	WP–PW	WP–PW	SM	1.02	1.23
29	3	Pastoria	Olive – El Camino	400	N–N	B–B	W	159.32	1.15
22	4	Ahwanee	Fair Oaks – Santa Inez	4,875	WP–N	WP–B	W	111.83	1.13
9	10	Fair Oaks	Evelyn – Old SF	2,350	PN–W	DB–DB	W	782.71	1.10
28	6	Moffett Park	City Limit – Mathilda	3,168	N–N	B–B	W	963.91	1.10
28	7	Moffett Park	Mathilda – Bordeaux	700	N–N	B–B	W	269.95	1.10
1	4	Maude	Mathilda – Wolfe	4,650	PN–NP	B–B	W	1,715.14	1.05
29	1	Pastoria	Evelyn – Sutter	2,700	NP–PN	B–BP	W	668.76	1.05
22	3	Ahwanee	Mathilda–Fair Oaks	5,975	WP–N	BP–B	W	1,500.01	1.00
30	11	Timberpine	Timberpine Ct – Lily	500	N–N	WP–WP	W	313.91	0.75
							Total ($K)	**12,034.99**	

Figure 5.1
Proposed Restriping (without travel lane removal or parking modifications)

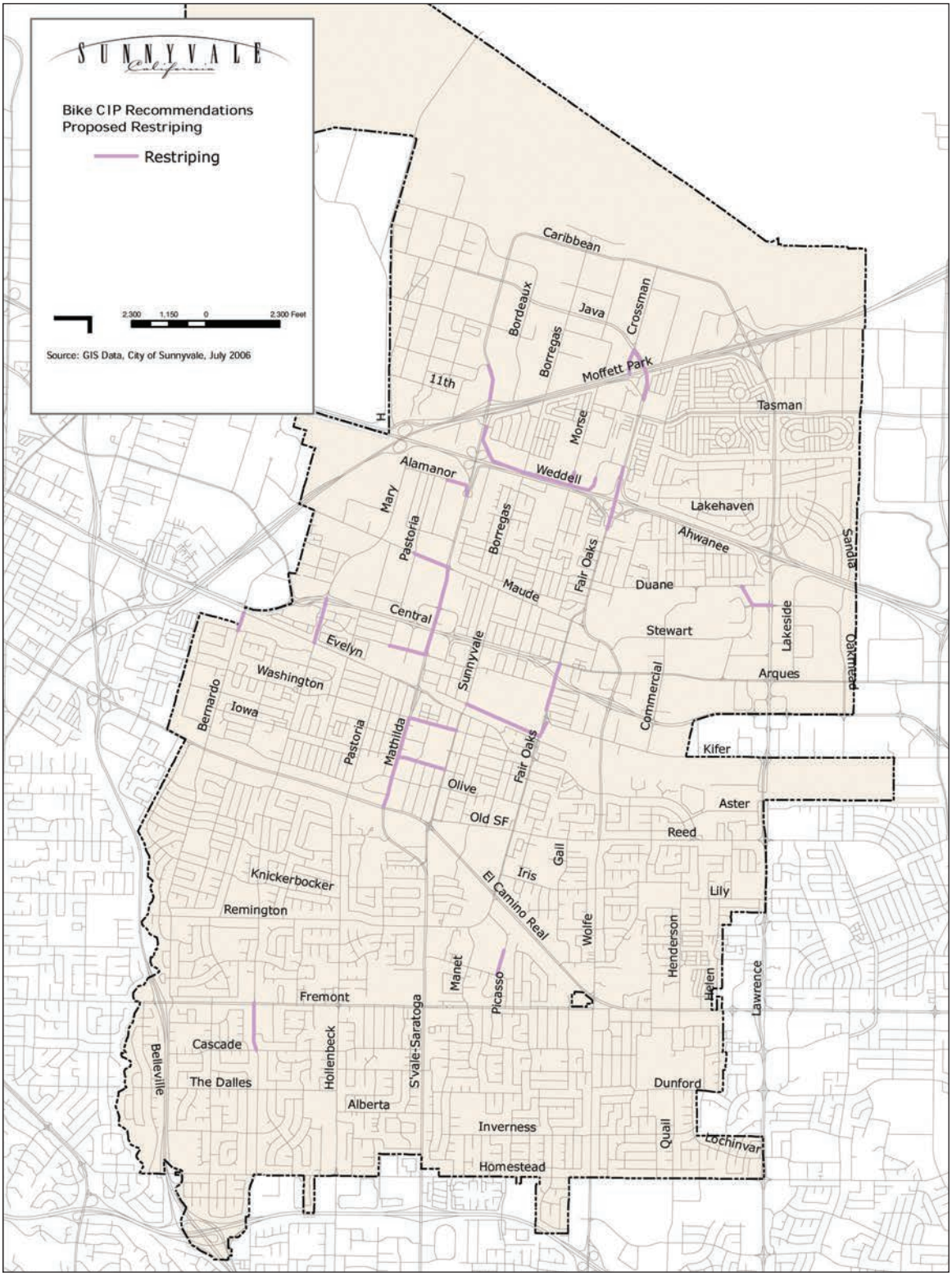


Figure 5.2
Proposed Travel Lane Removal

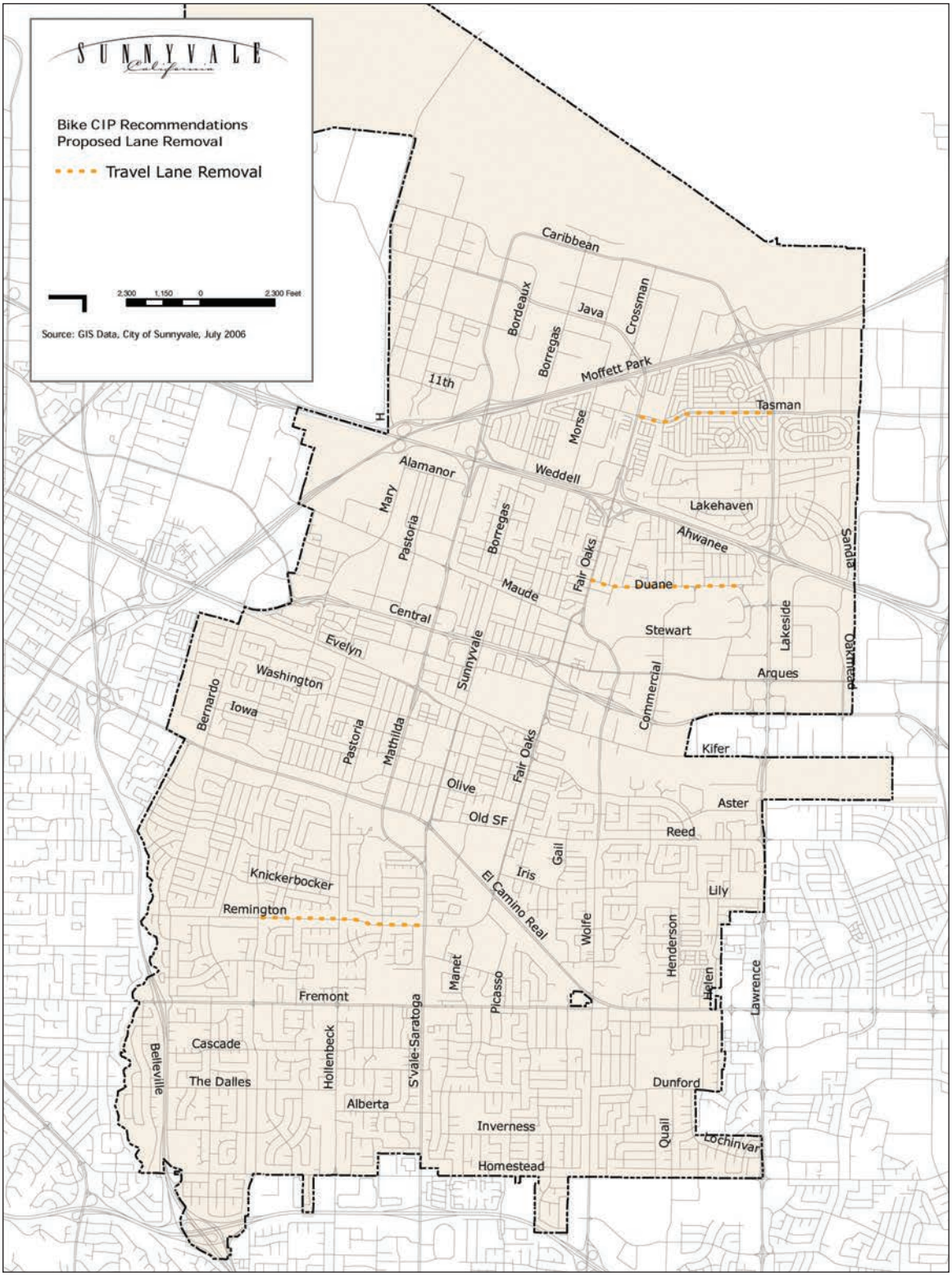


Figure 5.3
Proposed Parking Modifications

Figure 5.4
Proposed Shared Lane Marking

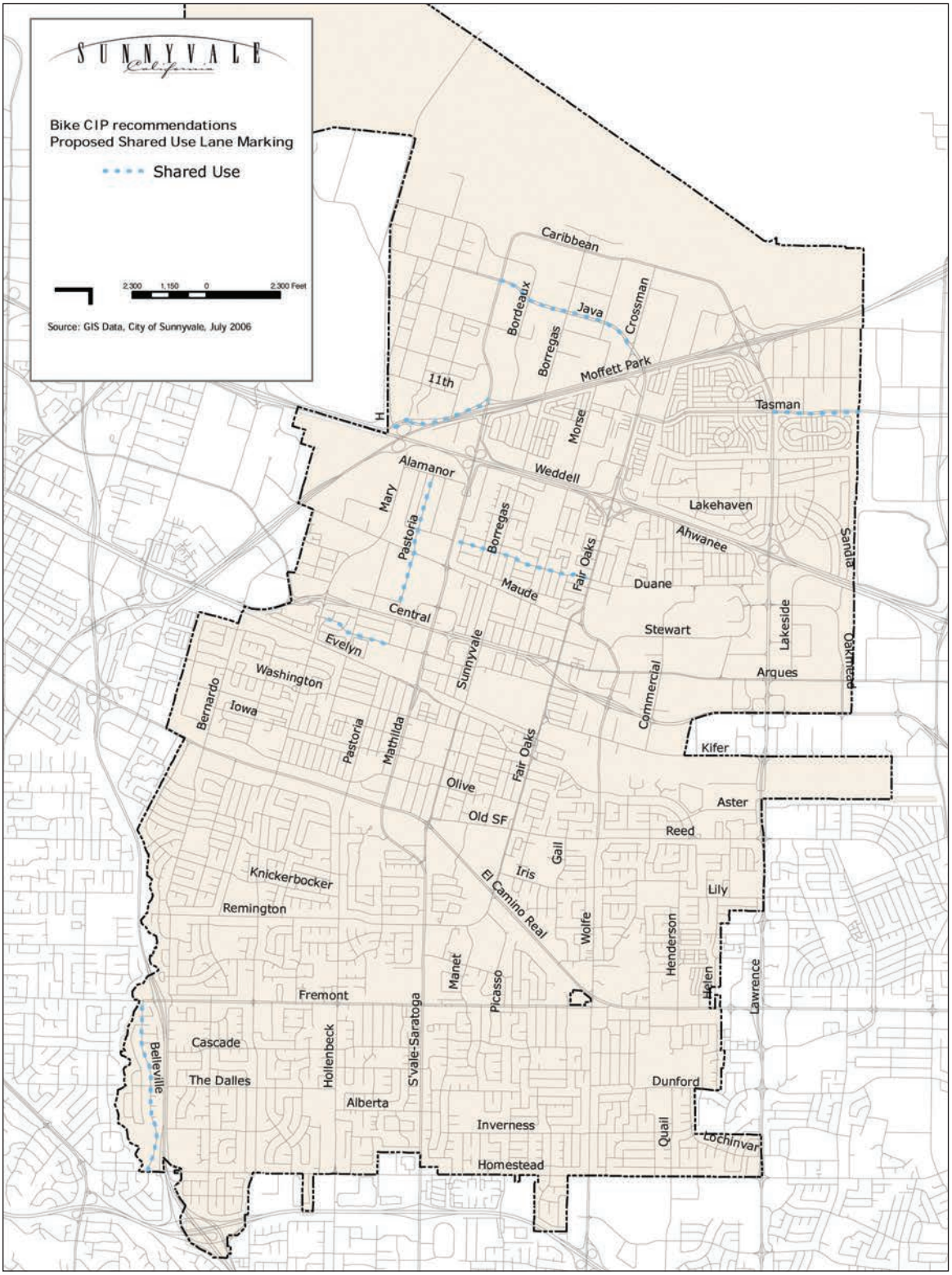


Figure 5.5
Proposed Speed Management

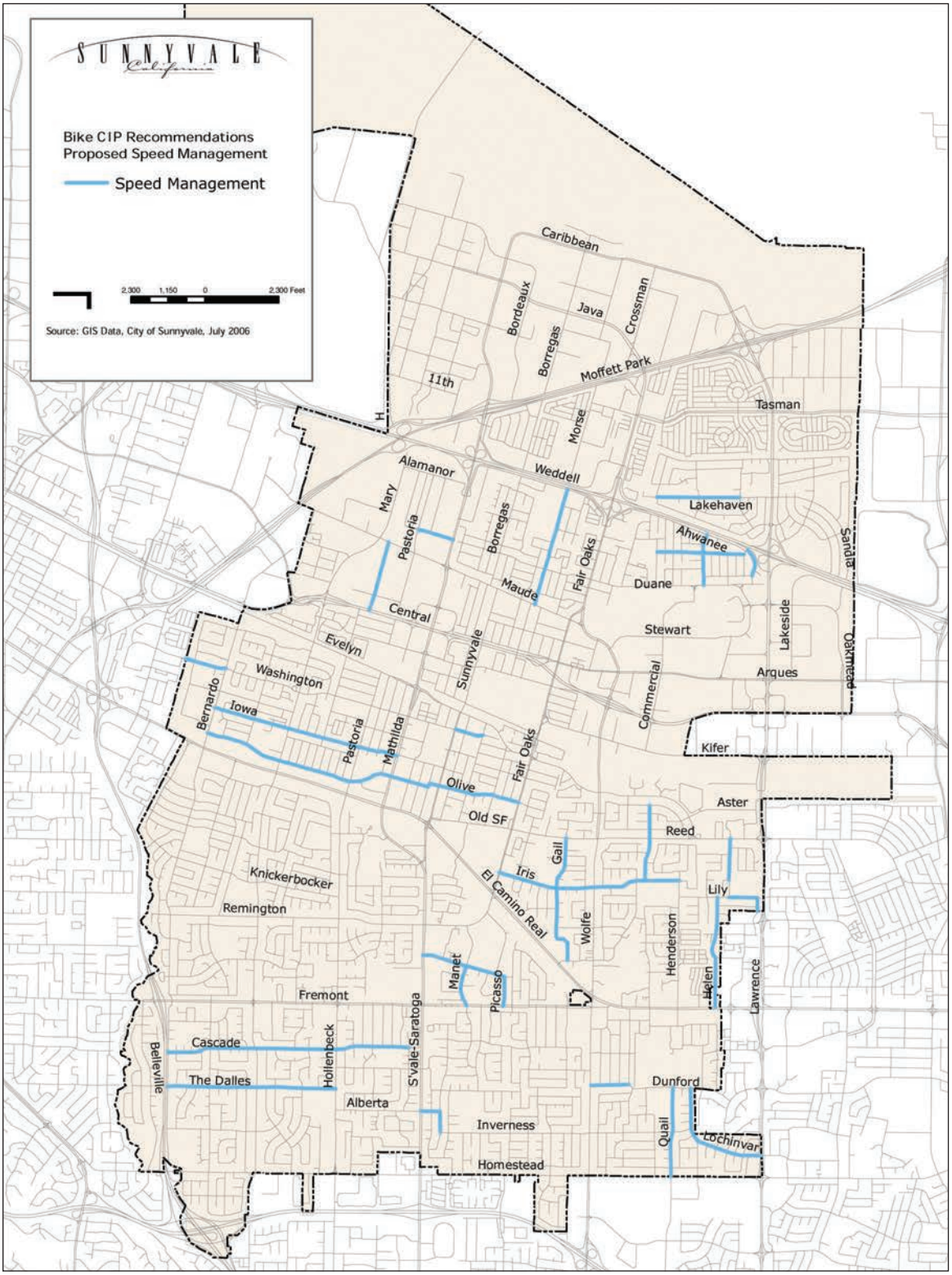


Figure 5.6
Proposed Roadway Widening

Figure 5.7
Summary of Recommendations

5.5 Past Expenditures

The following is a list of bicycle improvement expenditures since 1993.

Table 5.5
Bicycle Capital Expenditures Since 1993

Roadway or Project	Improvements	Amount
Mary Avenue	Reduce lanes to widen shoulders for bike travel	
Homestead Road	Restrict parking to add bike lanes	
Route 237/Maude Avenue	Improve shoulder area for bike lanes	
Bay Trail at Calabazas Creek	Construct bridge	$80,000
Bay Trail	Various improvements	
Signalized Intersections	Install bicycle-sensitive loop detectors	$47,250
Hetch-Hetchy Path ("JWC Greenbelt")	Realignment	$9,000
Fair Oaks Avenue - Persian Drive	Construct bicycle path	$32,500
Hetch-Hetchy Path ("JWC Greenbelt")	Reconstruct, Lakewood Park to Weddell Drive	
Maude Avenue	Add bike lanes	$350,000
Public Safety Dept. - Bicycle Patrol	Purchase equipment	$6,000
Sunnyvale Avenue	Resurface railroad crossing	$450,000
Mary Avenue	Resurface railroad crossing	$550,000
2nd Avenue Extension	Add bike lanes	
Parks, city-wide	Add bicycle racks	
Arterials and collectors, city-wide	Various bicycle improvement opportunities	$50,000
Caribbean Drive, Mathilda - Moffett Park Drive	Restripe for bike lanes	$104,400
Borregas Ave, Maude - Ahwanee	Add bike lanes	$45,000
Arques Ave, Fair Oaks - Santa Trinita	Add bike lanes	$106,100
County Bike Route 8		$80,000
Sunnyvale Bicycle Network		$350,000
Sunnyvale Caltrain Station	Bicycle improvements	
Lawrence Caltrain Station	Bicycle improvements	
Evelyn Avenue	Add bike lanes	$170,000
"Connecting North and South Sunnyvale for Bikes" project		$262,000
Calabazas Creek Trail		$433,000

City of Sunnyvale 2006 Bicycle Plan

Appendices

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Appendix A: Toolkit of Bikeway Improvements

The 2000 Bicycle Capital Improvement (CIP) study defined a toolkit of bicycle facility improvement types and identified the most likely type for each roadway segment in the City. Sunnyvale's 2006 Bicycle Transportation Plan updates this toolkit by adding:

- A "parking pockets" variation of minor widening
- A "Speed Management" option (for low volume residential collector streets where parking removal or substandard-width striped bicycle-and-parking lanes were previously recommended)
- A "Bicycle Boulevard" enhancement of speed management

Table A.1 lists the options in the updated toolkit:

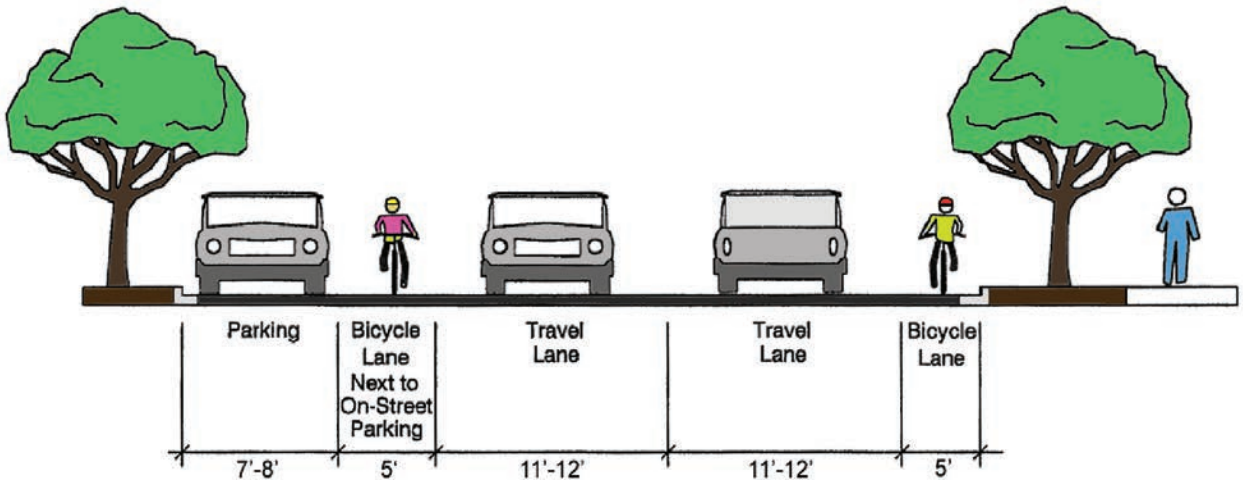
Table A.1
Toolkit of roadway improvement options

Roadway or Project Improvements			Bike Plan Figure
1	**Re-striping** (without parking reduction or widening)		
	a) Without travel lane removal		5.1
	b) Removal of a travel lane, and possible addition of a center turn lane where none existed	Considered where vehicles per lane per peak hour is sufficiently low. Adding a center-turn lane creates opportunities for median refuges that improve pedestrian crossing safety.	5.2
2	**Parking modifications**		5.3
	a) Parking removal, both sides	Choice depends on land use (residential or commercial), occupancy, turnover, and time-of-day patterns, and the availability of off-street or side-street parking	
	b) Parking removal, one side		
	c) Time-restricted parking		
3	**Widening**		5.6
	a) Parking pockets	Where a landscape strip is present, creating indentations for parking to avoid widening entire blocks	
	b) Minor widening	Not requiring utility relocation or property acquisition	
	c) Major widening	Requiring utility relocation or property acquisition	
Tools for streets without bike lanes			**Bike Plan Figure**
4	**Shared Lane Marking**	Considered where bike lanes are desirable but lane removal, parking modifications and widening are impractical	5.4
5	**Speed management**	For low-volume residential streets where cyclists can be passed using the full street width	5.5
	a) Without traffic control changes		
	b) "Bicycle Boulevard" treatment	Speed management combined with traffic control changes to reduce the number of locations at which a bicyclist must stop.	

A.1 Bicycle accommodation dimensions

Bicycle lanes along an uncurbed roadway edge may be as narrow as 4'. Along curb and gutter, the minimum is 5' to provide pedal clearance from the curb, with an additional requirement of at least 3' of asphalt outside the gutter. Where parallel parking is present, the combined bike lane and parking area must be at least 12', and 13' is desirable for safe "door zone" clearance especially where there is substantial parking turnover.

Figure A.1
Typical Bicycle Lane Section – With and Without Parking

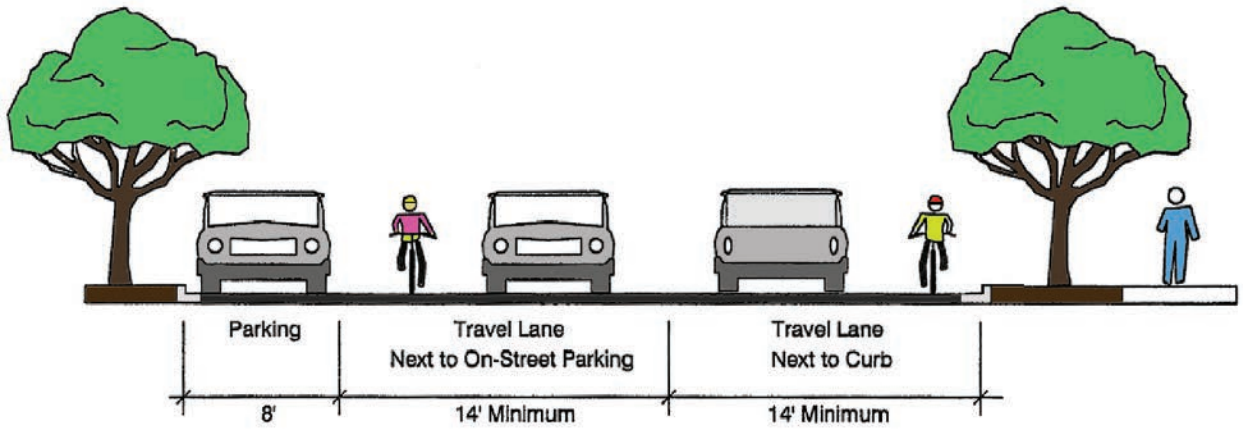


Sunnyvale's design minimums for lane widths are:

- 11' for travel lanes on arterials
- 10' for travel lanes on other streets
- 11' for center turn lanes (measured outside-to-outside), or 10' inside-to-inside

On streets without bike lanes, outside lanes at least 14' wide make it possible for motor vehicles to overtake bicycles without encroaching into the adjacent lane.

Figure A.2
Typical Bicycle Route Section (Wide Outside Lanes)



The following sections describe each toolkit option. As noted in Table A.1, Bicycle Plan Figures 5.1 through 5.7 show the streets for which each option is applicable.

A.2 Restriping

RESTRIPING WITHOUT TRAVEL LANE REMOVAL

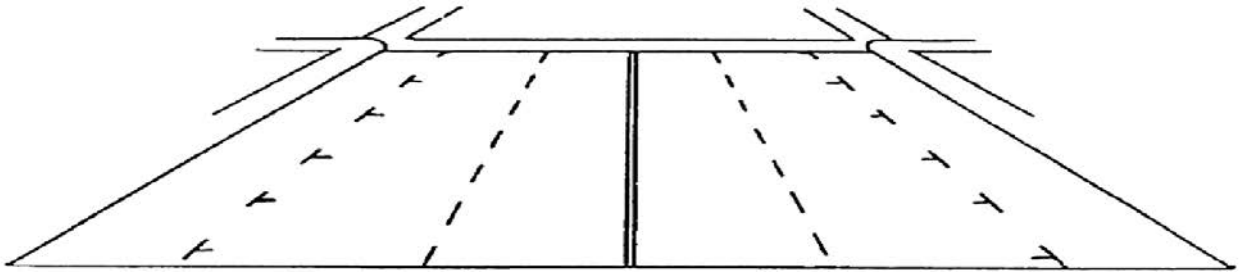
On some street segments, bike lanes can be added by narrowing lanes (subject to the City's minimum-width standards) without removing lanes. The City's goal is to extend bike lanes to the limit line or crosswalk, but where there is inadequate width to do so because of turn lanes or islands the bike lane can be dropped on the approach.

TRAVEL LANE REMOVAL

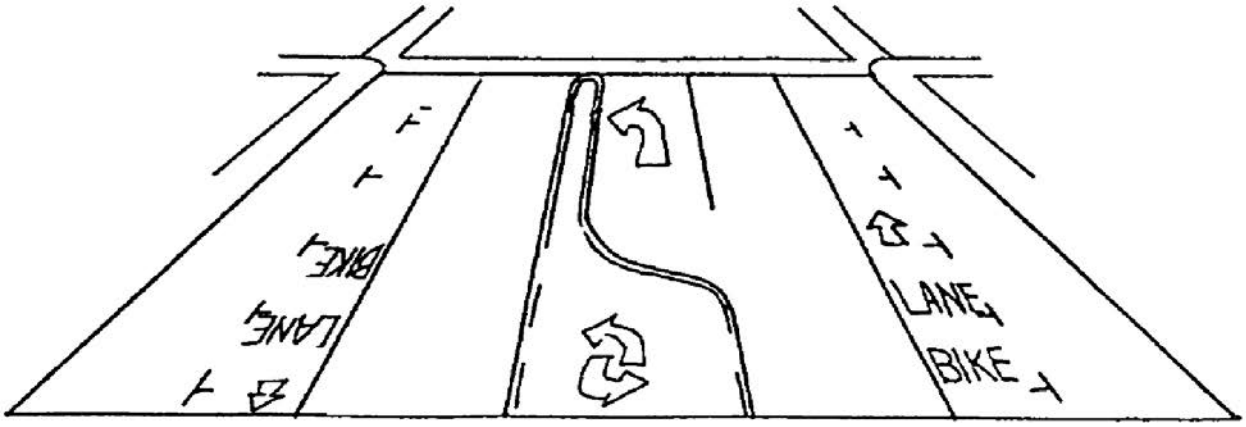
On streets with significant excess vehicle capacity, it may be possible to add bike lanes by removing one travel lane in each direction. Because a travel lane is roughly twice the width of a bike lane, removing two travel lanes can also enable the addition of a center turn lane or parking.

One specific type of travel lane removal, the "4 to 3 conversion", changes a street from four travel lanes (two in each direction) and no center turn lane, to two travel lanes (one in each direction) and a center turn lane, as shown in Figure A.3. In addition to being more comfortable for bicycling, the converted street is considerably safer for pedestrians to cross because the single travel lanes eliminate the "multiple-threat" collision mode in which a motorist in the near lane stops but hides a far-lane motorist who does not see the pedestrian. Pedestrian crossing safety can be further increased by adding median islands where needed, for example where a trail or a minor-street bike route crosses the busier street. Conversions to one travel lane per direction also increase safety by reducing excess speed, because they allow prudent drivers to set the pace.

Figure A.3
Adding bike lanes with a "4 to 3 conversion"



(BEFORE)

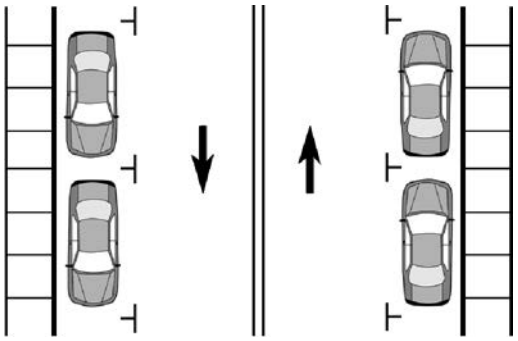


(AFTER)

A.3 Parking modifications

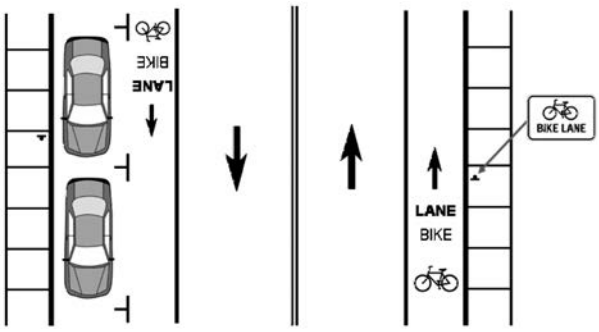
Figure A.4 shows several options for adding bicycle lanes by removing or restricting parking on one or both sides of a street.

Figure A.4
Parking modification options for adding bike lanes

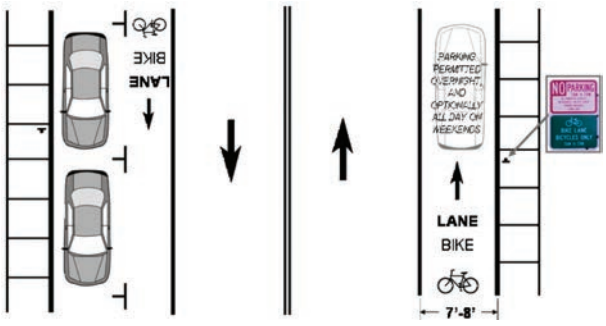


a) Parking both sides, no bike lanes

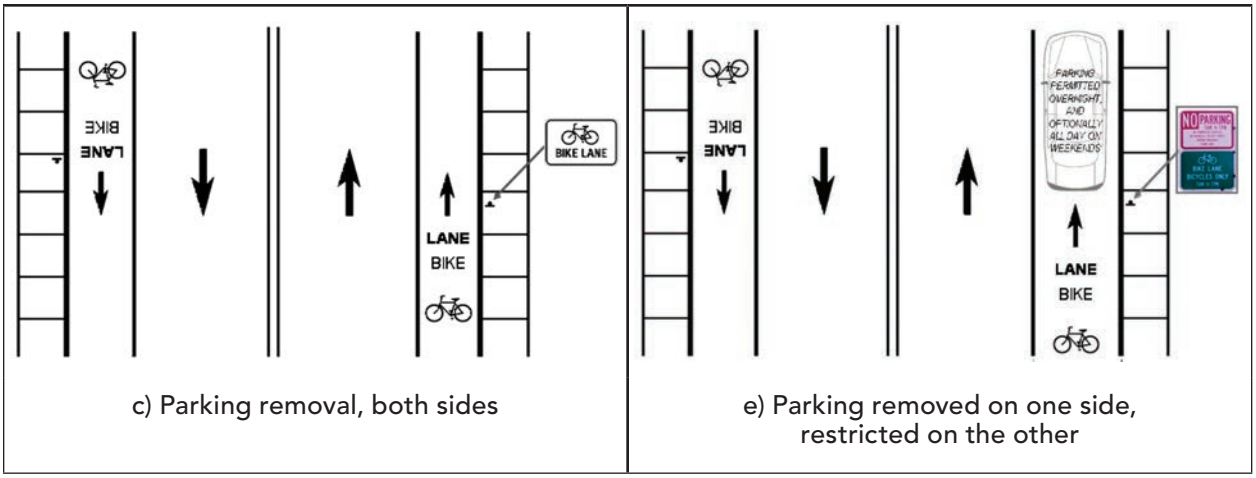
"Daytime bike lane" sign assembly (Palo Alto)



b) Parking removal, one side



d) Parking on one side, restricted on the other side



The 2000 Bicycle CIP proposed parking removal (sub-figure c) on streets where parking utilization was below 10% during both average daytime and nighttime periods. One-sided parking (b) was proposed where more than 60% of vehicles were parked on one side during the daytime. Daytime parking restrictions (d, e) were suggested as an option where daytime utilization was below 20% (residential) or 15% (workplace areas). This option is especially useful where there is no good alternative route for school (student) or work (adult) bicycle commuters.

A.4 Widening

On street segments where all travel lanes are needed and parking is either necessary or not present, adding bike lanes may require widening. Widening is "minor" if it can be accomplished within the existing right-of-way without utility relocations. "Major" widening requires property acquisition or removal of structures.

"Parking pockets" are a special case of minor widening where a landscape buffer strip is present and where parking demand is low but still high enough that parking removal is deemed infeasible. A parking pocket is a curb indentation into the landscape strip for one or more car lengths, enabling cars to be parked partly or fully behind the curb. This approach could be considered for the east side of Wolfe Road between Maria Avenue and Reed Avenue, a segment that currently has Shared Roadway Bicycle Markings.

Another special case of minor widening is the relocation of a median without modifying outside curb and gutter. Although this type of change is within the existing right of way, it may require relocation of utilities in the median. It may be possible to add bike lanes to parts of Mathilda Avenue between California Avenue and US-101 without modifying the outside curb and gutter, by removing parking from one side and shifting the median.

A.5 Shared Roadway Bicycle Marking

Bike lanes are the appropriate accommodation on streets where motor vehicles travel considerably faster than bicycles and traffic volume in the same or opposite direction makes safe passing difficult. On some streets where these conditions apply, constraints on available width or the difficulty of modifying parking may preclude the addition of bike lanes at least in the short term. This situation requires bicyclists to proactively ensure their safety by occupying enough of the available outside lane width to remain clear of parked cars whose doors might open, and of debris near the right edge of the roadway.

The Shared Roadway Bicycle Marking is now an approved traffic control device in California on streets with parallel parking. It is intended to show bicyclists how far from the right edge they should travel to avoid opening car doors, and to inform motorists that bicyclists will use the street and will stay clear of car doors for their safety. The approved marking consists of a bicycle icon and a double chevron as shown in Figures A.5 through A.7. Experimentation conducted in San Francisco found this marking superior to an earlier shape that enclosed the bicycle symbol in a hollow arrow, whose nickname ("sharrow") has come to be applied to the approved symbol as well. At the federal level this device is called the "Shared Lane Marking"; it has not yet been incorporated in the MUTCD.

Sunnyvale currently uses these markings on Wolfe Road between Maria Avenue and Reed Avenue, where daytime residential parking is relatively light but not deemed feasible to remove, in part because the long blocks on this segment mean that Wolfe Road resident and visitor parking cannot reasonably be shifted onto the relatively distant cross streets. However, the high vehicle speeds and low parking occupancy on that segment causes most cyclists to shift to the right in the long gaps between parked cars, forcing them to negotiate back out into traffic to pass the next parked car. Based on this experience, parking occupancy and speed differential should be considered when evaluating other street segments for Shared Roadway Bicycle Markings.

Figure A.5
Shared Roadway Bicycle Marking

Figure A.6
Marking in use

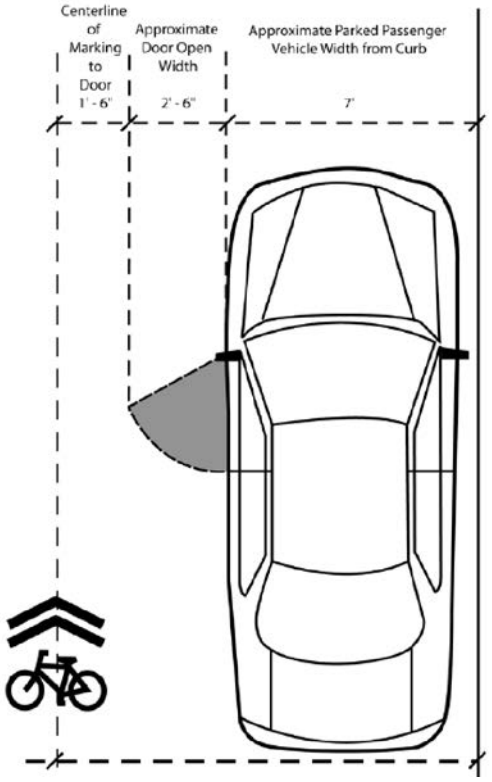


Figure A.7
Lateral placement of marking
(centered 11′ or more from curb face)

Before the Shared Roadway Bicycle Marking became available, Sunnyvale's practice for high-conflict narrow-outside-lane situations was to post "Share The Road" warning signs like the one shown in Figure A.8. Such signs were used on Sunnyvale Avenue between Evelyn Avenue and El Camino before that segment underwent a 4-to-3 lane reduction to reach its present layout. The 2003 Manual on Uniform Traffic Control Devices, which California has adopted as its Traffic Manual, has a "Share The Road" plaque (W16-1) for use with the W11-1 bicycle symbol sign as shown in Figure A.9.

Figure A.8
Sunnyvale "Share The Road" sign (from 2000 Bicycle CIP)

Figure A.9
MUTCD "Share The Road" sign assembly

Figure A.10
Experimental regulatory sign for narrow-lane situations

The intended meaning of "Share The Road" is "pass in the adjacent lane, when it is safe to do so". However, some motorists and bicyclists interpret it to mean "yield the lane so motor vehicles can pass without delay". This ambiguity limits the usefulness of the "Share The Road" message, even when augmented by graphics. Several jurisdictions around the U.S. are now experimenting with clearer regulatory messages for such situations, notably the "Bicycles May Use Full Lane" wording under consideration for a future MUTCD (Figure A.10). San Francisco uses "Bicycles Allowed Use Of Full Lane" signs in conjunction with Shared Roadway Bicycle Markings.

A.6 Speed Management

OVERVIEW

Bicycle lanes are inappropriate on streets with low traffic volumes. A bicycle lane's purpose is to facilitate overtaking of bicyclists by motorists where motor vehicles travel considerably faster than bicycles, and where traffic volume in the same or opposite direction makes overtaking difficulty or delay-prone.

On the residential and minor-collector streets that form several of Sunnyvale's "neighborhood" bike routes, traffic volumes are low enough that passing maneuvers can use the full width of the street, which is supported by the fact that these streets have either a dashed centerline or no centerline. On many such streets, daytime parking demand is sufficiently high that parking removal or daytime restriction may be infeasible.

The appropriate bicycle accommodation on such local streets is to deter speeding so that bicyclists - especially schoolchildren and parents riding with children - are comfortable sharing the street with motor traffic that can pass using the other half of the street. On some parts of neighborhood routes, turns or jogs every few blocks limit speeding, but additional measures may be needed on long straight segments without frequent stop signs. Deterring speeding on residential streets also benefits pedestrians, and reduces the attractiveness of the street for cut-through traffic.

SUNNYVALE'S NEIGHBORHOOD TRAFFIC CALMING PROGRAM

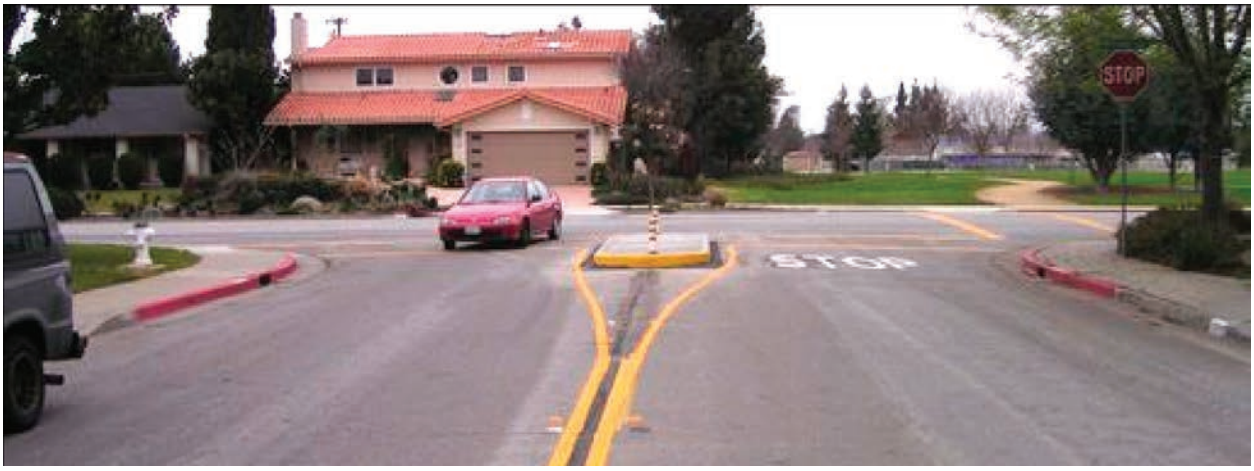
Sunnyvale has a neighborhood traffic calming program consisting of two levels. The first level involves education and enforcement including radar speed signs; the second level adds engineering measures that physically limit the maximum speed of vehicles. Figure A.11 shows several examples: a neighborhood traffic circle that limits speeds to 12-15 mph at an intersection, a speed hump that limits speeding in the middle of a long block, and a median "gateway" island to prevent high-speed turns into a block. All of these measures including the circle are "bicycle-friendly"; traffic volumes are low enough that bicyclists can pass by the circle when no car is traversing it in the same direction.

Streets classified as arterials or collectors are not eligible for the traffic calming program. This is partly because vertical speed management devices such as speed humps and speed tables are not appropriate on higher-volume streets, and neighborhood traffic circles are not applicable above approximately 2,500 vehicles per day because of the need for large trucks to turn left in front of the island. "Gateway" islands as shown in Figure A.11(c) are considered to be on the neighborhood street, not the major street.

Figure A.11
Neighborhood traffic calming devices in Sunnyvale

a) Neighborhood traffic circle, Canary Drive at Loch Lomond Court

b) Speed hump, Canary Drive between Inverness Way and Loch Lomond Court



c) "Gateway" island at start of block, Canary Drive at Inverness Way

BICYCLE BOULEVARDS

A "bicycle boulevard" is a bicycle route using neighborhood or local streets on which stop signs have been largely shifted onto cross streets, enabling uninterrupted through bicycle travel. Because "turning" many stop signs in this way can attract through motor traffic to the route, it may be necessary to compensate with traffic calming devices or motor vehicle through-movement restrictions. The result is a preferential "throughway" for bicycles that retains full local access by motor vehicle to all parcels along the route.

In some cases the motor vehicle through-movement restriction may take the form of a natural barrier such as a creek or park, across which bicycles but not cars can travel. In other cases the restriction is artificial, for example street closures or mandatory right-turn islands at collector- or arterial-street signals, with provision for bicycles to make the through movement at these locations.

Palo Alto's Bryant Street, the original Bicycle Boulevard, extends approximately three miles from south Palo Alto through downtown to the Menlo Park city limit. Its vehicular through movement restrictions consist of bicycle-and-pedestrian-only bridges across Adobe Creek and San Francisquito Creeks, two bicycle-permeable street closures, vehicle right turn islands at an arterial signal, and a neighborhood traffic circle. Bryant parallels Alma Street, an arterial roadway, and Middlefield Road, a major collector.

Bicycle boulevard candidates in Sunnyvale include The Dalles Avenue, the Alberta-Inverness route, the Evelyn-to-Tantau route described in the Bicycle Plan, Washington Avenue north of downtown, and possibly Morse Avenue between California Avenue and Ahwanee Avenue. The Sunnyvale / Maude / Borregas Avenue route to Moffett Park that will be created by the completion of the two freeway bicycle bridges will be another bicycle boulevard candidate because the bridges are gaps for motor traffic.

Figure A.12
Motor vehicle through-restrictions on Palo Alto's Bryant Bike Boulevard

a) Bicycle-admitting street closure at Lowell Avenue

b) Bicycle- and pedestrian-only bridges at Adobe Creek

c) Bicycle-through / motor vehicle right-turn-only at Embarcadero

Appendix B: Municipal Code Sections Relevant to Bicycling

B.1 Title 10: Vehicles and Traffic

The California Vehicle Code (CVC), like most state vehicle codes:

- explicitly enumerates regulatory powers granted to local authorities such as cities and counties,
- reserves for the state all such powers not so enumerated, and
- implicitly permits all activities not explicitly regulated.

Specifically, the CVC permits local authorities to regulate bicycle licensing, operation on sidewalks, and parking, but not to regulate bicycle operation on public streets. Several Municipal Code sections appear to do so; these are indicated with an asterisk in the Sections column of Table B.1 and discussed further in Table B.2.

Table B.1
Municipal Code – Chapter 10.56 Bicycles

Sections	Description (italics indicate paraphrased sections, [bracketed italics] are comments
10.56.020-10.56.120 **Bicycle licensing**	*Bicycles must display a DMV-issued license sticker. The fee is $3. Licenses are valid up to 3 years. Licenses must be affixed to license plates attached to the seat tube. Bicycles are inspected before being licensed, and are not licensed if not road-worthy. Licenses may be transferred when a bicycle is sold. Mutilating a bicycle's frame or license to prevent identification is unlawful. Licenses are required on rental bicycles. Bicycles believed to be stolen may be impounded for up to five days.*
10.56.130. **Equipment**	*Equipment required by California Vehicle Code section 21201 on bicycles operated on public highways is required in Sunnyvale for operation off public highways.*
10.56.150. **Riders-Seats-Number**	*Extends California Vehicle Code section 21204, which applies to riding on public highways, to riding anywhere in Sunnyvale.*
10.56.140. **Riding on sidewalks and overhead pedestrian crossings-Prohibited**	(a) Riding bicycles, motor driven cycles, and motor scooters is prohibited on sidewalks and also on overhead pedestrian crossings signed for pedestrian use only. Children under the age of thirteen years must walk their bicycles upon any overhead pedestrian crossing that is signed for pedestrian use only. (b) Sidewalk cycling is prohibited between ages 13 and 61. Children under 13 and adults over 61 may ride in single file on sidewalks except those adjacent to schools, stores, or other commercial buildings, exercising due care and yielding right of way to pedestrians. However, anyone regardless of age may ride on a sidewalk if riding in the adjacent street would be unsafe.
*10.56.160 **Speed**	It is unlawful for any person to operate a bicycle on a street or highway at a speed greater than is reasonable or prudent having due regard for the traffic on, and the surface and width of, the street or highway, and in no event at a speed which endangers the safety of persons or property.
10.56.170 **Stunt Riding**	It is unlawful for any person riding or operating a bicycle to perform or attempt to perform any acrobatic or stunt riding upon any street or highway or other public place. This section is not meant to prohibit stunt riding as part of officially sanctioned events, or places clearly posting stunt riding as appropriate.

Sections	Description (italics indicate paraphrased sections, [bracketed italics] are comments
*10.56.180. **Emerging from alley or driveway**	The operator of a bicycle emerging from an alley, driveway or building, upon approaching the sidewalk area extending across any alley or driveway, shall yield the right-of-way to all pedestrians approaching on the sidewalk or sidewalk area, and upon entering the roadway shall yield the right-of-way to all vehicles approaching on the roadway close enough to constitute a hazard
*10.56.200. **Towing, pulling or pushing persons or objects prohibited**	It is unlawful for any person operating a bicycle to tow or pull any person or object from the rear thereof, except attachments specifically designed for this purpose, or push or propel any person or object in front of the bicycle.
*10.56.210. **Group riding.**	It is unlawful for any persons operating bicycles upon a roadway to ride more than two abreast.
10.56.220. **Parking**	It is unlawful for any person to park, or allow to remain parked, any bicycle (1) upon any public street or roadway other than in such a manner that some portion of the bicycle touches the curb and so as to afford the least obstruction to vehicular traffic; or (2) upon any public sidewalk except in a bicycle rack, or against a building, or by means of a stand to maintain the bicycle in a vertical position, or at a curb, and in such a manner as to afford the least obstruction to pedestrian traffic.
10.56.230. **Parking zones.**	It is unlawful for any person to park, or allow to remain parked, any bicycle (1) upon any public street or roadway other than in such a manner that some portion of the bicycle touches the curb and so as to afford the least obstruction to vehicular traffic; or (2) upon any public sidewalk except in a bicycle rack, or against a building, or by means of a stand to maintain the bicycle in a vertical position, or at a curb, and in such a manner as to afford the least obstruction to pedestrian traffic.
10.56.240. **Obedience to traffic control devices.**	It is unlawful for any pedestrian or person operating a bicycle to disobey the directions of any traffic control device on public or private property unless otherwise directed to do so by a public safety officer or unless it is unsafe to do so at the time. A pedestrian walking a bicycle has all the rights and is subject to all of the regulations applicable to pedestrians.
10.56.250. **Riding on school grounds and playgrounds.**	It is unlawful for any person to ride or operate a bicycle in a reckless or irresponsible manner upon any playground or school ground where children are present.
10.56.260. **Bicycle lanes, routes, and bikeways established.**	The city council by resolution or motion may establish bicycle lanes and routes along designated streets or portions of streets. The city council by resolution or motion may establish bicycle paths in the interest of providing transportation, recreation and developing open space programs. The city council by resolution or motion may establish bikeways as defined in the Streets and Highways Code as the same exist or may be amended hereafter. Any person operating a bicycle along a bicycle route or Class III bikeway as defined in the Streets and Highways Code shall be subject to all of the rights and duties applicable to the operators of motor vehicles generally along the streets or portions of streets so designated, such designation being intended only to inform the operators of bicycles that such streets or portions of streets afford an expeditious route of travel by bicycle, and to alert the operators of motor vehicles of the likelihood of a higher incidence of bicycle traffic where the roadway is so marked.
10.56.270. **Bicycle lanes, routes, paths, and bikeways-Signs and markings.**	The city traffic engineer shall designate bicycle lanes, routes, paths and bikeways by the placement of appropriate signs and roadway markings.

Sections	Description (italics indicate paraphrased sections, [bracketed italics] are comments
*10.56.280. **Bicycle lanes-Class II bikeways-Use required and restricted.**	When signs and markings are in place giving notice of the existence of any bicycle lane or Class II bikeway as defined in the Streets and Highways Code, it is unlawful for any person: (a) To operate a bicycle along any portion of the roadway of a street so designated other than within the bicycle lane or bikeway on the right side of the roadway, except for the purpose of passing another bicycle or to avoid an obstruction. (b) To operate any vehicle other than a bicycle along and within a bicycle lane or bikeway, except for the purpose of making a legal turning maneuver.
10.56.285. **Bicycle paths-Class I bikeways-Use required and restricted.**	When signs and markings are in place giving notice of the existence of any bicycle path or Class I bikeway established by this chapter, it is unlawful for any person: (a) To operate any unauthorized vehicle along any portion of the bicycle path or bikeway; (b) To operate a bicycle on the bicycle path or bikeway other than safely when passing pedestrians or bicyclists. This requirement does not prohibit a bicyclist from choosing to operate on a roadway when a Class 1 bikeway is available. (c) To operate a bicycle other than in a manner consistent with Section 9.62.040(h); (d) To fail to obey all signs and markings regulating use of the bicycle path or bikeway; (e) To operate a bicycle at all times in any manner other than with reasonable regard to the safety of all others, which shall include but not be limited to signaling all turns; passing to the left of any bicycle, authorized vehicle, or pedestrian being overtaken; and passing to the right of any oncoming bicycle, authorized vehicle or pedestrian.
10.56.286. **Map showing bicycle facilities.**	There shall be maintained on file in the department of public works and available for inspection by the public, a map showing the bicycle lanes, paths, routes, and bikeways, as established from time to time by the city council.
10.56.290. **Provisions requiring Caltrans approval-Withdrawal of approval.**	Any provision of this chapter which regulates bicycles, or delegates the regulation of bicycles upon the state highways or state freeways in any way for which the approval of Caltrans is required by law, shall cease to be operative six months after receipt by the city council of written notice of withdrawal of approval of Caltrans. Immediately upon the effective date of such revocation, the city clerk shall enter upon the original copy of the ordinance codified in this section a notification of such withdrawal.
10.56.300. **Regulation of bicycles on state highways or freeways-Prior approval requirement.**	Whenever this chapter delegates authority to a city officer, or authorizes action by the city council to regulate bicycles upon a state highway or a state freeway in any way which by law requires the prior approval of Caltrans, no such officer shall exercise such authority nor shall action by the city council be effective with respect to any state highway without the prior approval in writing of Caltrans when and to the extent required by Division 11 of the Vehicle Code.
10.56.310. **Violation-Infraction.**	Any person violating a provision of this chapter pertaining to licensing shall be subject to the maximum fine allowed under California Vehicle Code Section 39011. Any person violating any of the provisions set forth in this chapter pertaining to the operation of a bicycle or any provision of a resolution establishing a bicycle path, lane or bikeway authorized by this chapter shall be guilty of an infraction and upon conviction thereof shall be punished as set forth in Chapter 1.04 of this code.

Table B.2 lists those Municipal Code sections that appear to regulate bicycle operation on public streets, a power not granted to local authorities by the California Vehicle Code. Sections 10.56.290 and 10.56.300 render inoperative any Municipal Code section for which Caltrans withdraws approval via written notice to the City Council, but any such conflicting section is unenforceable regardless of such notice.

Table B.2
Municipal Code sections that conflict with California Vehicle Code

Sunnyvale Municipal Code	California Vehicle Code (CVC)	Notes
10.56.160 (Speed)	22350 (Basic Speed Law)	
10.56.180 (Emerging from Alley or Driveway, yield to pedestrians on sidewalk and vehicles on roadway)	21804 (Entry Onto Highway) 21952 (Right-of-Way on Sidewalk)	
10.56.200 (Towing, Pushing, Pulling)	21203 (Hitching Rides)	
10.56.210 (Group Riding)	None	The CVC does not prohibit group riding.
10.56.280 (Use of Bike Lanes)	21208 (Permitted Movements from Bicycle Lanes)	The CVC allows bicyclists to leave a bike lane for these other reasons: • Traveling as fast as the normal speed of traffic • Avoiding a right turn area • Preparing for a left turn

B.2 TITLE 19: ZONING

The current Sunnyvale Zoning Code requires bicycle parking only for multifamily residences. However, the Code ties the provision of bicycle commuter support facilities (showers and/or dressing rooms) to the approvable Floor Area Ratio and required number of vehicle parking spaces of a proposed workplace development.

Table B.3
Municipal Code – Chapter 19 (Zoning) sections relating to bicycling

Chapter 19.12: Definitions	
19.12.030. "B"	(5) "Bicycle parking, secured" means bicycle parking facilities located in convenient, safe, clean and well-lighted areas, near building entrances, out of pedestrian paths, and within view of windows, security offices or high volumes of pedestrian traffic. Secured bicycle parking shall be protected from the weather and have surfaces that are mud, dust and debris free, and not be adjacent to car parking or traffic lanes without adequate protection. Secured bicycle parking devices shall include the following: lockers; or enclosed, locked limited access areas with rigid metal racks or fixed stationary objects which allow the bicycle frame and both wheels to be locked with a bicycle locking device or the bicyclist supplying a lock and six-foot cable. Secured bicycle parking shall be located in a flat area on the ground level. If located within a building, secured bicycle parking shall be easily accessible on the ground floor or by elevator to other floors. Reasonable and sufficient ingress and egress must be provided so that a bicycle may be easily moved in and out of the locker or locked limited access area.
Chapter 19.32: Building Heights, Lot Coverages, and Floor Area Ratios	
19.32.070. Floor area ratio (FAR).	(a) The total floor area ratio of all buildings on a parcel zoned M-S or M-3 and occupied in whole or in part by the following uses shall not exceed thirty-five percent:.... (b) The following are exceptions to the total floor area ratios set forth in (a):.... (5) Bicycle support facilities. When showers and/or dressing rooms are provided for use by bicycle commuters, the floor area occupied by such facilities may result in an increase in total floor area ratio of up to forty percent if approved through the miscellaneous plan permit process. Request for higher percentage substitutions shall be reviewed by the planning commission using the use permit process.
Chapter 19.46: Off-Street Parking and Loading	
19.46.030. Preferential parking for car pool vehicles; bicycles.	(c) In lieu of up to five percent of required vehicle parking, secured bicycle parking may be allowed in industrial areas as follows: (1) Eight secured bicycle parking spaces for one vehicle space; or (2) One shower and dressing room with clothing lockers for bicycle commuters for two vehicle spaces; or (3) A combination of bicycle parking and showers/locker rooms. Up to five percent reduction of vehicle parking shall be considered through the miscellaneous plan permit process. Additional secured bicycle parking in lieu of vehicle parking shall be reviewed by the planning commission using the use permit process.
19.46.050 Parking Standards	Table 19.46.050: Parking Requirements lists vehicle parking requirements and includes this Note (see 19.12.030 for definition of "secured bicycle parking) Note 1: Multifamily residential developments of five or more units shall have secured bicycle parking at a ratio of one secured bicycle parking space for every four units, but no fewer than four spaces.
Chapter 19.88 Use Permits	
19.88.020 Authority	Authority for action on a use permit shall be vested as follows: .... (b) Major use permit determined by the planning commission for: .... (2) Floor area ratio which would otherwise meet the maximum of thirty-five percent except that floor area occupied by showers and/or dressing rooms provided for use by bicycle commuters increases the total floor area ratio over forty percent. This FAR bonus over thirty-five percent shall only be allowed for bicycle related facilities;

Appendix C : Standard Operating Procedure – Bicycle and Pedestrian Safety Through Work Zones

The City of Sunnyvale sets forth rules and requirements for private and public construction activities in its Standard Operating Procedures (SOPs). The following two-page SOP and the subsequent figure address bicycle accommodation through work zones.

CITY OF SUNNYVALE

STANDARD OPERATING PROCEDURES
BICYCLE AND PEDESTRIAN SAFETY THROUGH WORK ZONES

Warning sign types and locations:

- For any lane closures on the right side of the street there will be four required signs.
  1. Road Work Ahead
  2. Right /Bike Lane Closed Ahead (depending on the situation)
  3. A Bike Warning Sign – either W-79, Share the Road, or Watch for Bicyclists. Staff prefers using the Watch for Bicyclists sign.
  4. Lane/Bike Lane Closed (depending on the situation)

Bike lane closures:

- For any bike lane closures there will be four signs required.
  1. Road Work Ahead
  2. Right /Bike Lane Closed Ahead (depending on the situation)
  3. A Bike Warning Sign – either W-79, Share the Road, or Watch for Bicyclists. Staff prefers using the Watch for Bicyclists sign.
  4. Lane/Bike Lane Closed (depending on the situation)
- Staff will try to provide a 14 foot wide travel lane in situations where bicycles and cars will need to share a lane. If this is not achievable, the Caltrans minimum of 10 feet will be required.

Sidewalk closures:

- A clear pedestrian path will be provided through any sidewalk construction.
  1. This could be attained by
  a) creating a pathway on the sidewalk around the construction, or through the parking strip
  b) creating a coned or barricaded area off of the sidewalk,
  c) designating a flagger to escort pedestrians safely through the work zones

2. If there is no clear pathway immediately available, pedestrians will be detoured. Any detour will include detailed signage. The pedestrian will be notified of the detour before they reached the construction sites so that no backtracking would be required. Elaborate pedestrian detours will be avoided if possible because staff has found them to be ineffective.

- Issues concerning provisions for people with disabilities will be handled on a case by case basis.

Sign placement for work zones that will not be closing any travel lanes:

- Work crews must warn roadway users of the work being conducted on the side of the roadway even when no travel lanes are being closed. In this situation, the warning signs will be placed off of the roadway as much as possible. Bicycle and pedestrian travel will be considered in the placement of the sign. Sign visibility and proximity to the work zone will also be considered.

Duration of work:

- Work crews may use their discretion regarding warning signs and traffic control on jobs that will last under 1 hour. Short duration work is defined as work that occupies a location up to one hour. It is appropriate to use colored or marked vehicles with rotating strobe lights, arrow panels or truck mounted signs in place of advance signs and channelizing devices.

Nighttime visibility:

- Retro reflective 28" cones will be used to barricade work zones at night.
- Barricades with reflective striping will be used to hold warning signs.
- Arrow boards will be used under some circumstances.
- All work being conducted by the city at night will only done on an emergency basis.

Storage of Equipment on-street:

- No storage of construction equipment or debris is permitted on the street outside of working hours.

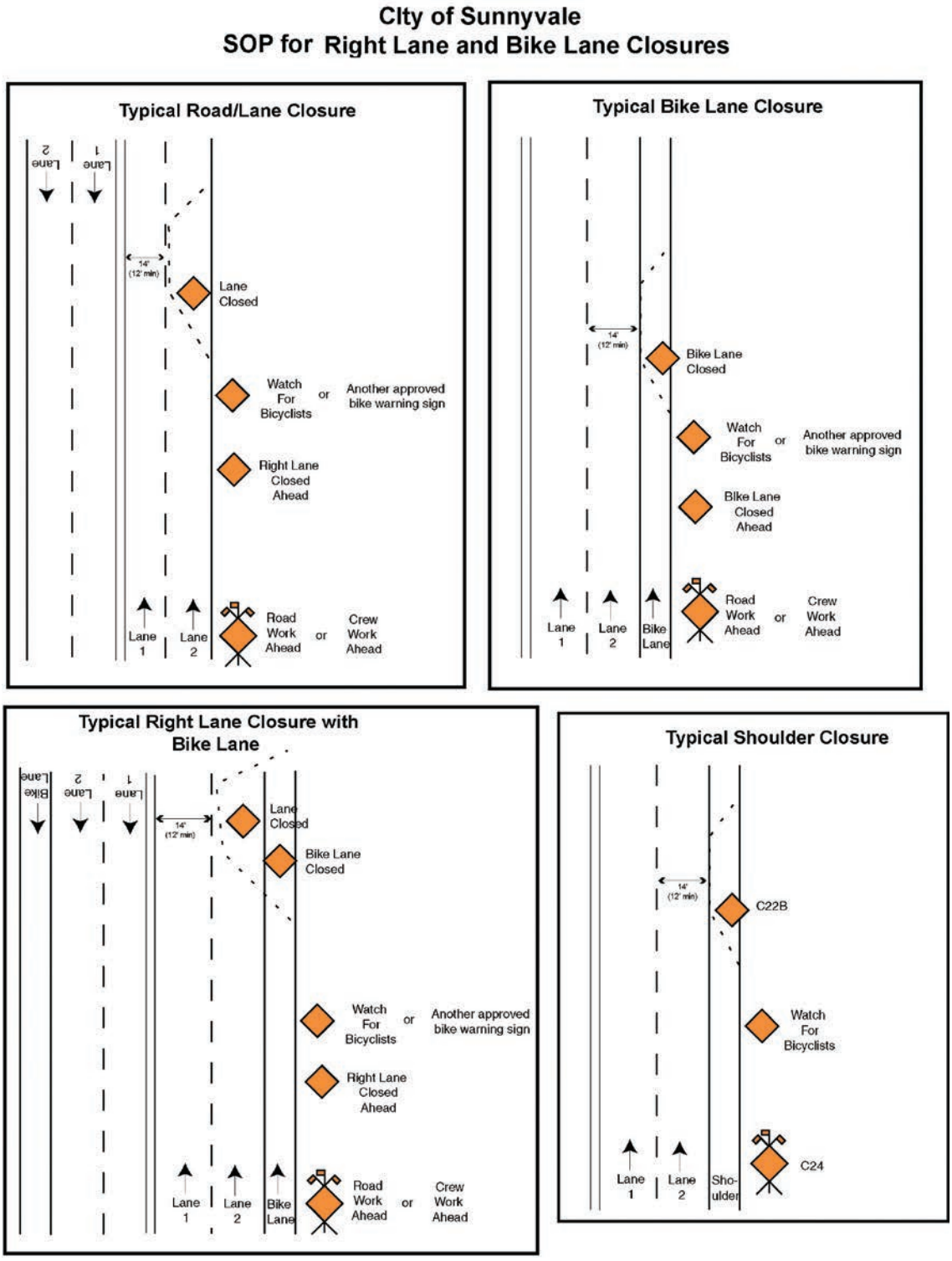
Outside contractor compliance:

- Provide all encroachment permittees with a copy of the city's SOP.
  1. Make contractors aware ahead of time that they will be required to secure their own signs.
  2. Staff will continue to make announcements to sign vendors that the City will be requiring these signs.

Complaint procedures:

- For complaints related to work done by city crews, all complaints will be routed through the "field services" answer point.
- For complaints related to work done for capital projects or by contractors with encroachment permits, all complaints will be routed to the Project Administration division.

Figure C.1
Standard Operating Procedure for Right Lane and Bike Lane Closures



Appendix D: Metropolitan Transportation Commission Pedestrian and Bicycle Safety TAP Report

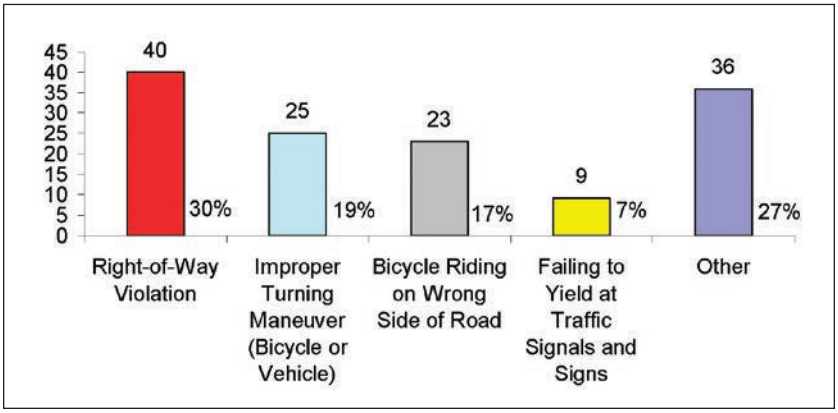
Bicycle Collisions

Between June 30, 1999 and June 30, 2002, there was a total of 133 bicycle collisions reported in Sunnyvale, California.

COLLISIONS

Figure 1, below, presents the top Primary Collision Factors (PCFs) for bicycle-related collisions in Sunnyvale during the study period.

Figure D.1
Primary Collision Factors for Bicyclists



Right-of-Way Violations

The largest category of collisions in Sunnyvale for cyclists involves a right-of-way violation. The party at fault in the majority of these collisions is the motorist at 80 percent of the collisions, while the cyclist is at fault 20 percent of the time. All collisions where the cyclist was found to be at fault involve males, and seven of eight involve males under 16. Interestingly, these collisions all involve female drivers.

Males between the ages of 30 and 45 represent the majority of drivers at fault in collisions involving a right-of-way violation. Overall, men represent 83 percent of drivers at fault in these crashes.

The two main vehicle code violations for right-of-way collisions are:

1) Drivers failing to yield to on-coming cyclists when executing a left turn at an intersection.

2) Drivers or cyclists failing to yield to on-coming traffic when exiting an alley or driveway. All collisions where the cyclist is at fault fall into this category.

For collisions in the first category, around half were at signalized intersections and half at uncontrolled

intersections. A majority occurred during daylight hours under clear conditions, and all were on major roads. Collisions in the second category occurred more often on minor roads, and all of the collisions involving cyclists in this category (i.e. males under 16) occurred on minor roads.

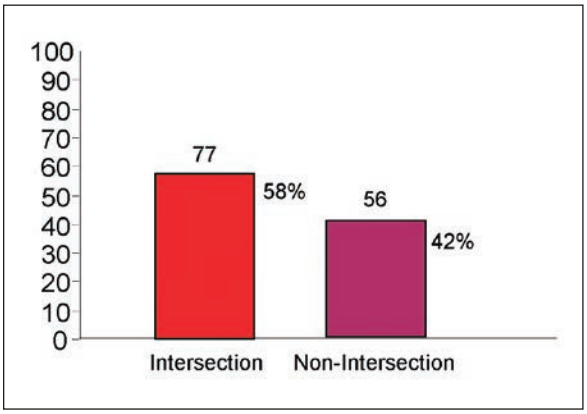
Improper Training

For collisions where the Primary Collision Factor is improper turning, motorists were found to be at fault in 85 percent of the collisions. In collisions where the motorist was at fault, a majority were the result of the motorist executing a right turn traveling in the same direction as the cyclist. Most likely, these are collisions where the cyclist was traveling to the right of the motorist when the motorist made the right turn.

Intersection and Non-Intersection Collisions

More than half of all reported bicycle collisions (including non-injury collisions) occurred at or near intersections, while 42 percent occurred away from intersections. Nationally, bicycle fatalities occur more often at non-intersection locations (66 percent).[1] Figure 2, below, presents the number and percentages of crashes involving bicyclists that occur at and away from intersections.

Figure D.2
Bicycle Collision Locations



Of the collisions that occurred at intersections, 64 percent of the locations were controlled intersections and 36 percent were uncontrolled. At controlled locations, drivers are more often at fault (65 percent of the time), while at uncontrolled locations, cyclists are at fault as often as drivers.

When cyclists are at fault at controlled locations, the two primary causes are red-light running and wrong-way riding. When drivers are found to be at fault at these locations, the pattern emerges at uncontrolled intersections. Drivers at fault at these locations are usually executing a left turn.[2] When the cyclist is at fault, wrong-way riding is the main cause for collisions, followed by improper turning.

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[1] *Traffic Safety Facts 2001: Pedalcyclists,* National Highway Traffic Safety Administration, *www.nrd.nhtsa.dot.gov/pdf/nrd-30/ncsa/tsf2001/2001pedal.pdf,* 7/12/03.

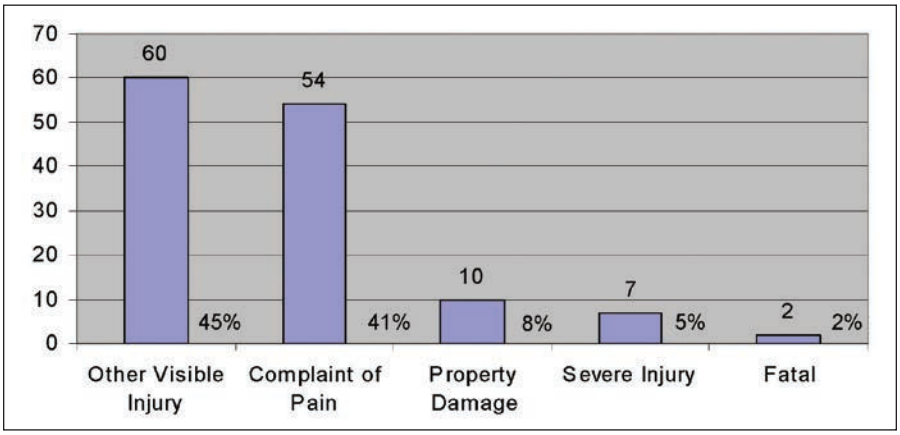
[2] *Although under "improper turning," the main cause of driver-at-fault collisions is making a right turn, a collision where the driver or cyclist is executing a left turn may be classified as a right-of-way violation or improper turning.*

At non-intersection locations where the cyclist is at fault, wrong-way riding – a large proportion of which is by adult males – is the primary cause, followed by "dart-out" collisions on minor roads where a cyclist is exiting a driveway or alley. These collisions have a higher number of minors (all male) involved in them as they encompass the "dart-out" collisions noted in the Primary Collision Factor section. The main causes for collisions when drivers are at fault include improper turning (usually executing a right turn) and entering traffic from an alley or driveway.

Extent of Injury

Figure 3 displays the extend of injury for bicycle collisions during the study period.

Figure D.3
Extent of injury for Bicycle Collisions



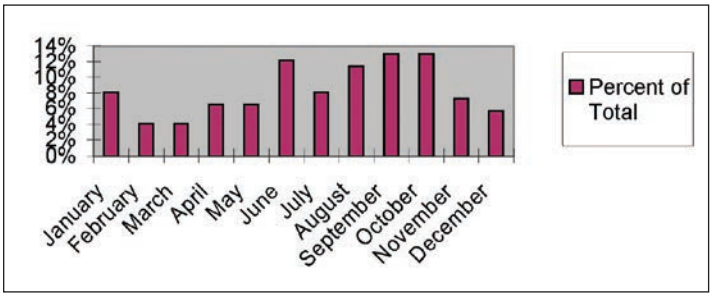
Of the most injurious collisions, those involving a visible or severe injury, drivers are most often at fault. Improper turning by motorists is the primary cause of these collisions. Male cyclist under 18 and between the ages of 19 and 25 are the primary group represented in the injurious crashes.

CONDITIONS

Seasonality

Figure 4 presents the percentages of bicycle collisions that occurred each month of the year. The summer and early fall months June through October appear to have the highest percentages of all collisions. This is the period when the weather is most conducive to bicycling; therefore, the spike in collisions is likely a result of higher bicycle ridership during these months. In fact, almost 60 percent of all bicycle collisions occur during this time. Additionally, 10 of the 13 collisions where the party oat fault is a male cyclist under 18 occur during these months. The same trend is not found among collisions where hte party at fault is a driver of either sex under 18.

Figure D.4
Bicycle Collisions byMonth



Weather and Lighting

As can be seen in Figures 5 and 6, a clear majority of bicycle collisions occur in clear weather and in daylight hours. According to the National Insurance Institute for Highway Safety, between one-quarter and one-third of all bicycle fatalities nationally occur during non-daylight hours. Although the collisions described below are not limited to fatal crashes, they appear to be consistent with national trends.

Figure D.5
Weather Conditions During Bicycle Collisions

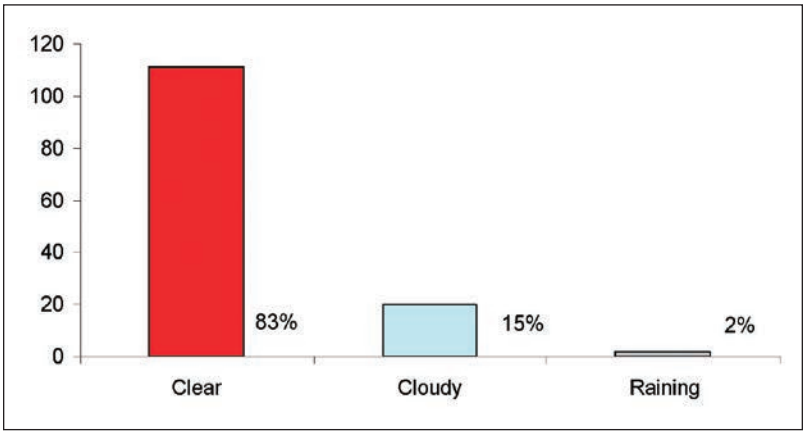
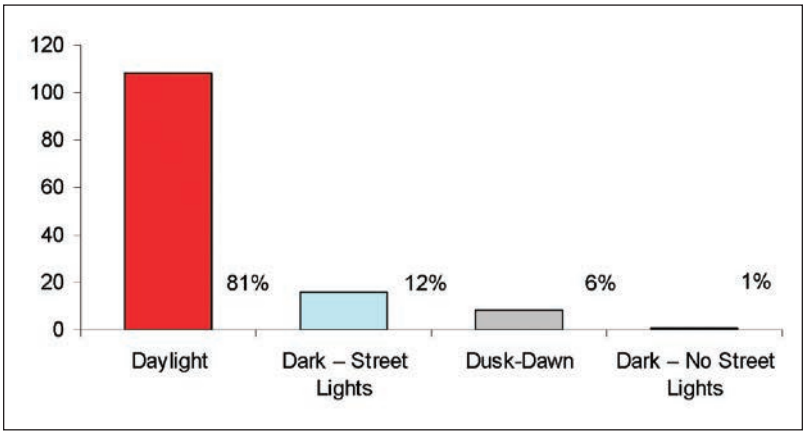


Figure D.6
Lighting Conditions During Bicycle Collisions



Around 20 percent of all collisions occur during non-daylight hours. Drivers and cyclists are equally at fault in collisions that occur at night or during the dusk-dawn hours. A large majority (72 percent) occur at intersections, with a 50-50 split between controlled and uncontrolled locations. The cause for these collisions follows a pattern similar to the pattern for intersection crashes overall. Almost half of the cyclists involved in these collisions are between the ages of 17 and 25, whether they are at fault or not. Half of the crashes that occur in non-daylight hours result in severe or visible injury.

DEMOGRAPHICS

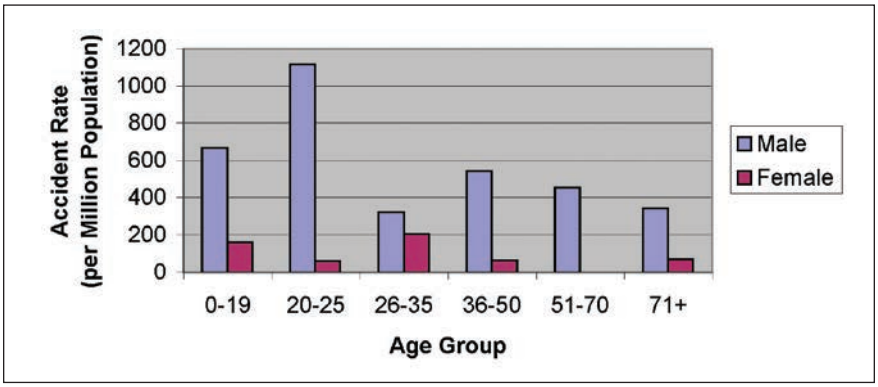
Male bicyclists in Sunnyvale under the age of 20 had the highest percentage of bicycle collisions during the study period. Across all age groups, male cyclists are involved with 84 percent of all bicycle collisions. Table 1 indicates that both males and females have collision rates almost twice the national average.

In collisions where female cyclists are at fault, wrong-way riding is the prevalent cause. Of the total 22 collisions that involve female cyclists, drivers are at fault in 68 percent. When male cyclists are involved in bicycle collisions, they are at fault more often than female cyclists (42 percent of the time).

Table D.1
Bicycle Collision Rates for Cyclists over the Age of 20 (per Million Population)

	Males	Females
Sunnyvale, California	505	92
National Rate	221	44

Figure D.7
Bicycle Accident Rates by Age and Gender



DUI

In all but one of the collisions involving alcohol, the cyclist was found to be at fault. While these collisions account for a small number (six) of the overall collisions, they result in severe injury more often. They mostly occur during daylight hours, a majority between three and five o'clock.

High Incidence Locations

The high-incidence locations for cyclists include the following intersections:

Top 5 Locations for Bicycle Collisions (mix of mid-block and intersections)

1. Mary Avenue at El Camino Real (5)
2. El amino Real between Cezanne Drive and Fair Oaks Avenue (3)
3. Mathilda at El Camino Real (2)
4. Olive at Mathilda (2)
5. Olive at Mary (2)

PARTNERSHIPS

School District

Sunnyvale has five school districts: the Sunnyvale School District, Santa Clara School District, Fremont High School District, Cupertino School District, and the private school sector. The City works with each of the districts at different need levels.

Police Department

Public Works has a good working relationship with the police departmen. They do not have regularly scheduled meetings, but frequent contact is made on a case-by-case basis.

Department of Public Safety

Public Safety and Transportation and Traffic share high collision location information. The two divisions are collaborating on development and operation of a shared databese for collision information.

Community Groups

The City has a staff liaison to the BPAC, which meets once a month. The BPAC sends one representative to the regional Bicycle Advisory Committee. The BPAC was formed in 1992. Apart from the BPAC, there are no advocacy or community organizations that staff interacts with on a formal regular basis.

PROGRAMS IN OTHER CITIES

Other cities participating in the SafetyTAP have policies that may be appropriate for the City of Sunnyvale.

Santa Rosa

Bicycle Map: Santa Rosa currently has a bicycle map available online that advertises to cyclists the most appropriate routes for cycling within the City. Sunnyvale residents may access the recently published VTA map online, but a map specific to Sunnyvale may also be useful.

Take a Free Ride Program: This program offers a list of incentives for employees to utilize alternative modes to commute to work. Funds for this program are provided for using a Transportation Fund for Clean Air (TFCA) grant.

Interlink pogram: This program provides transportation services and support for children with disabilities. The programs also sponsors “Barrier Awareness Day” in October.

Napa

Share the Road Signs: The City of Napa Traffic Engineering Department has policies for installing “Share the Road” signs along Class III facilities with high collision histories, high bike and auto volumes, and right-of-way constraints.

Junior Traffic Patrol: The Napa Junior Traffic Patrol originated in 1955 as a cooperative effort between the Napa Police Department and area schools. Each year, students selected for the program receive training from the Police departmentand accept responsibility for controlling pedestrian and vehicle traffic at and around their school.

Fremont

Junior Safety Patrol: The Junior Safety Patrol is the result of a partnership betweenthe Fremont Police Department, the Fremont Unified School District, and the California State Automobile Association. With a volunteer staff member or parent at each school, fifth and sixth grade students are trained to ensure safety of pedestrians at corssings near the school.

Figure D.8
All Bicycle and Pedestrian-Involved Collisions

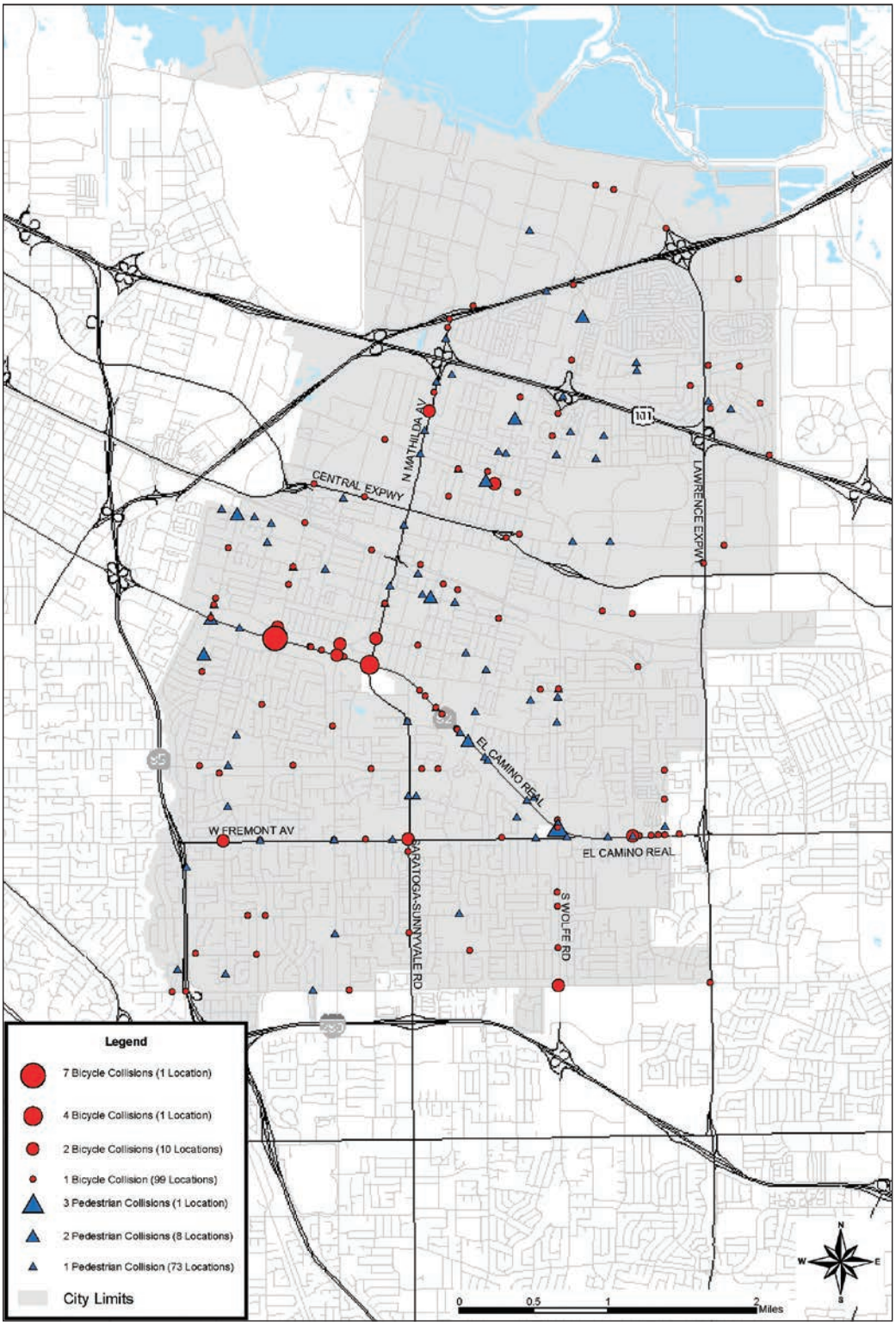


Figure D.9
High Frequency Locations

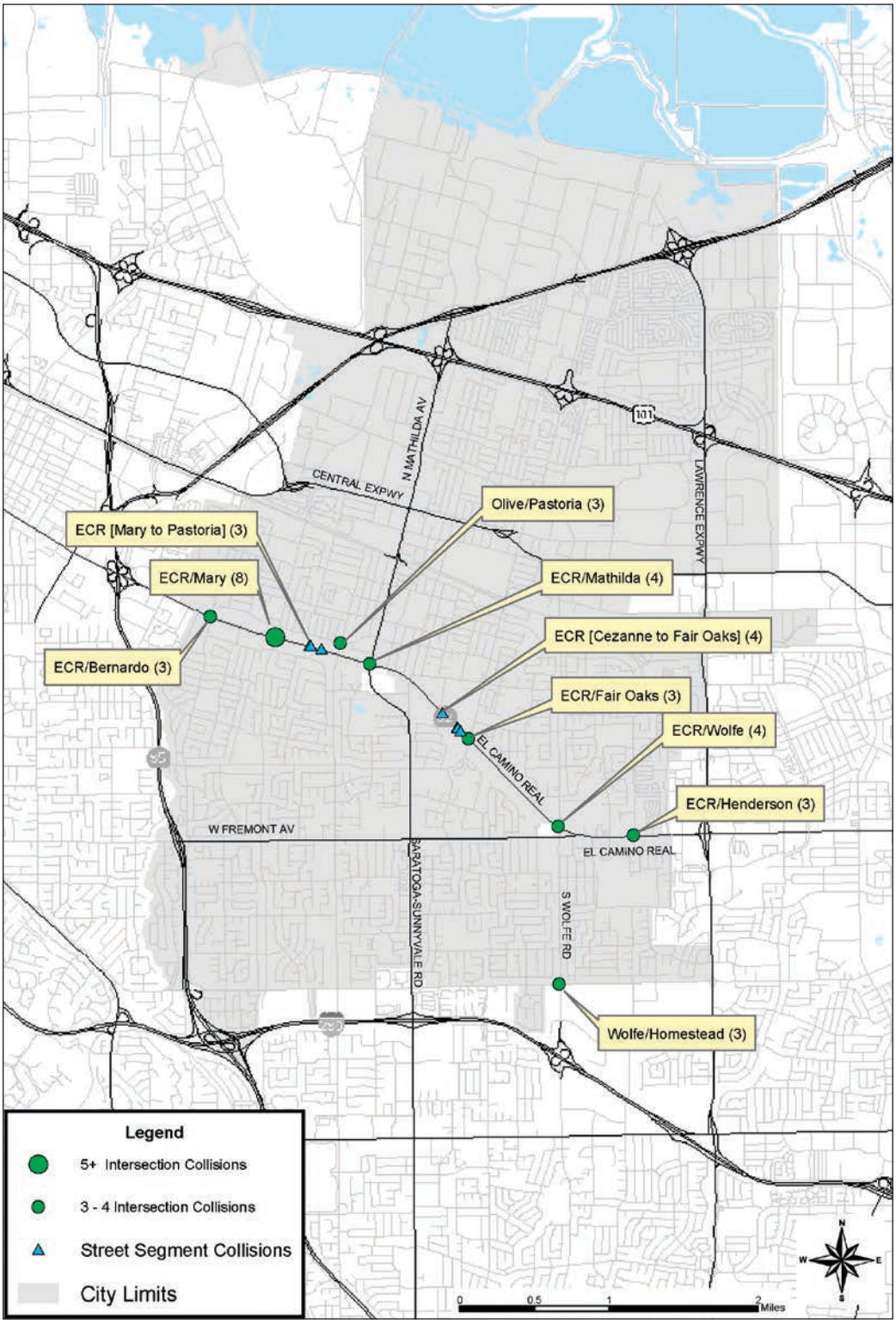


Figure D.10
Locations of Bicycle Collisions with Bicyclist at Fault

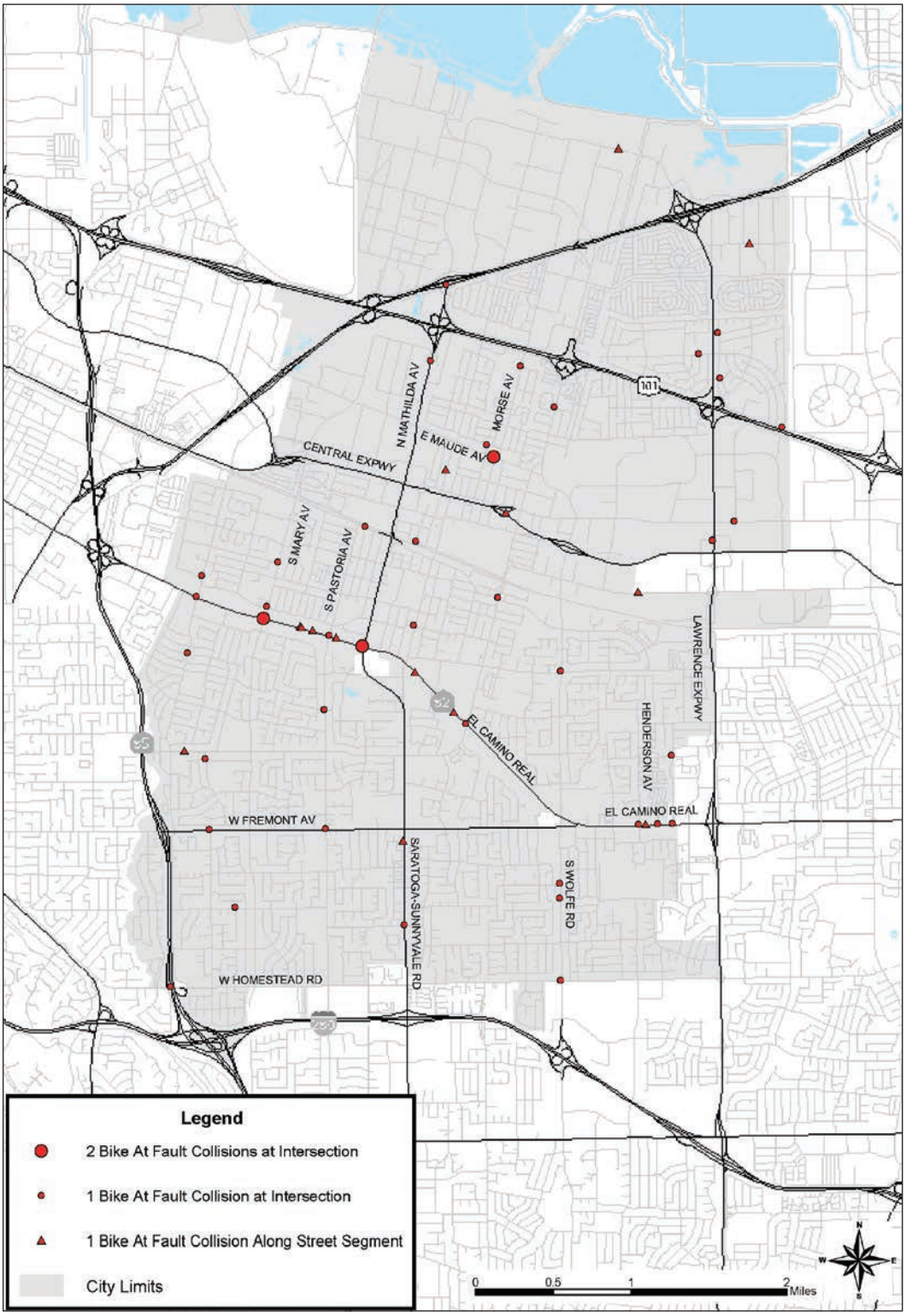


Figure D.11
Locations of Bicycle Collisions with Driver at Fault

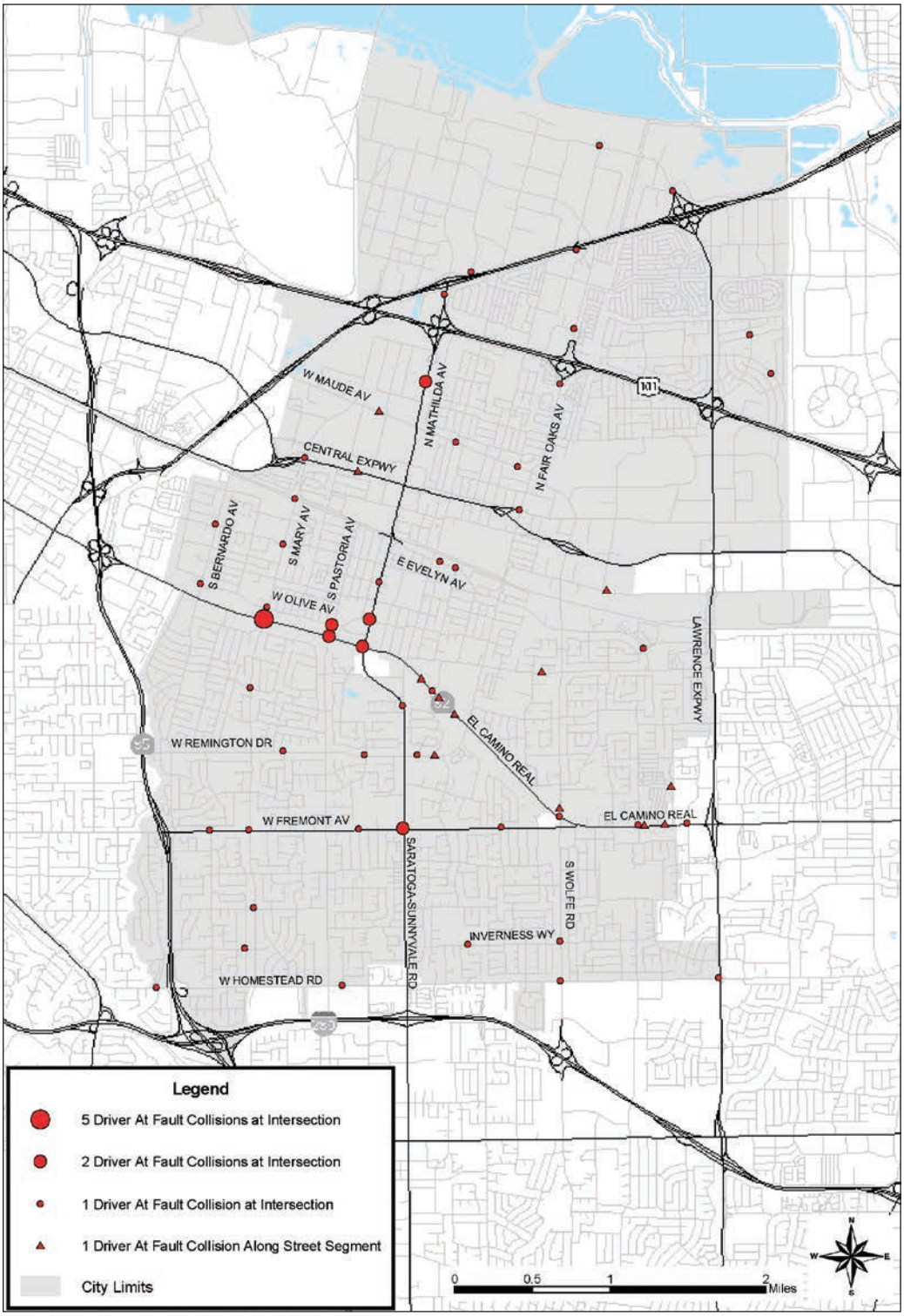


Figure D.12
Top Primary Collision Factor for Bicyclist at Fault Collisions

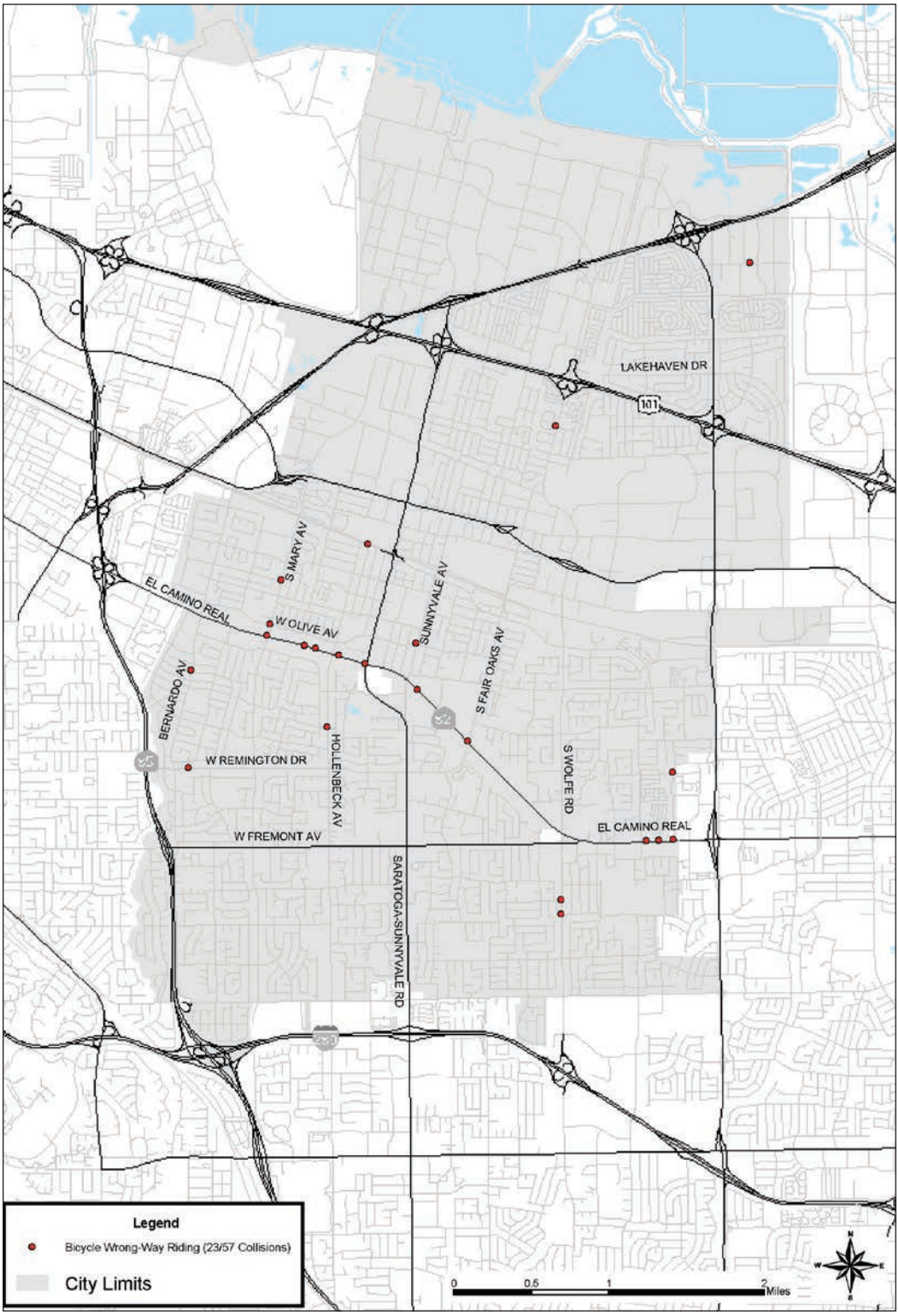


Figure D.13
To PCF for Driver at Fault Collisions Invovlving Bicyclists

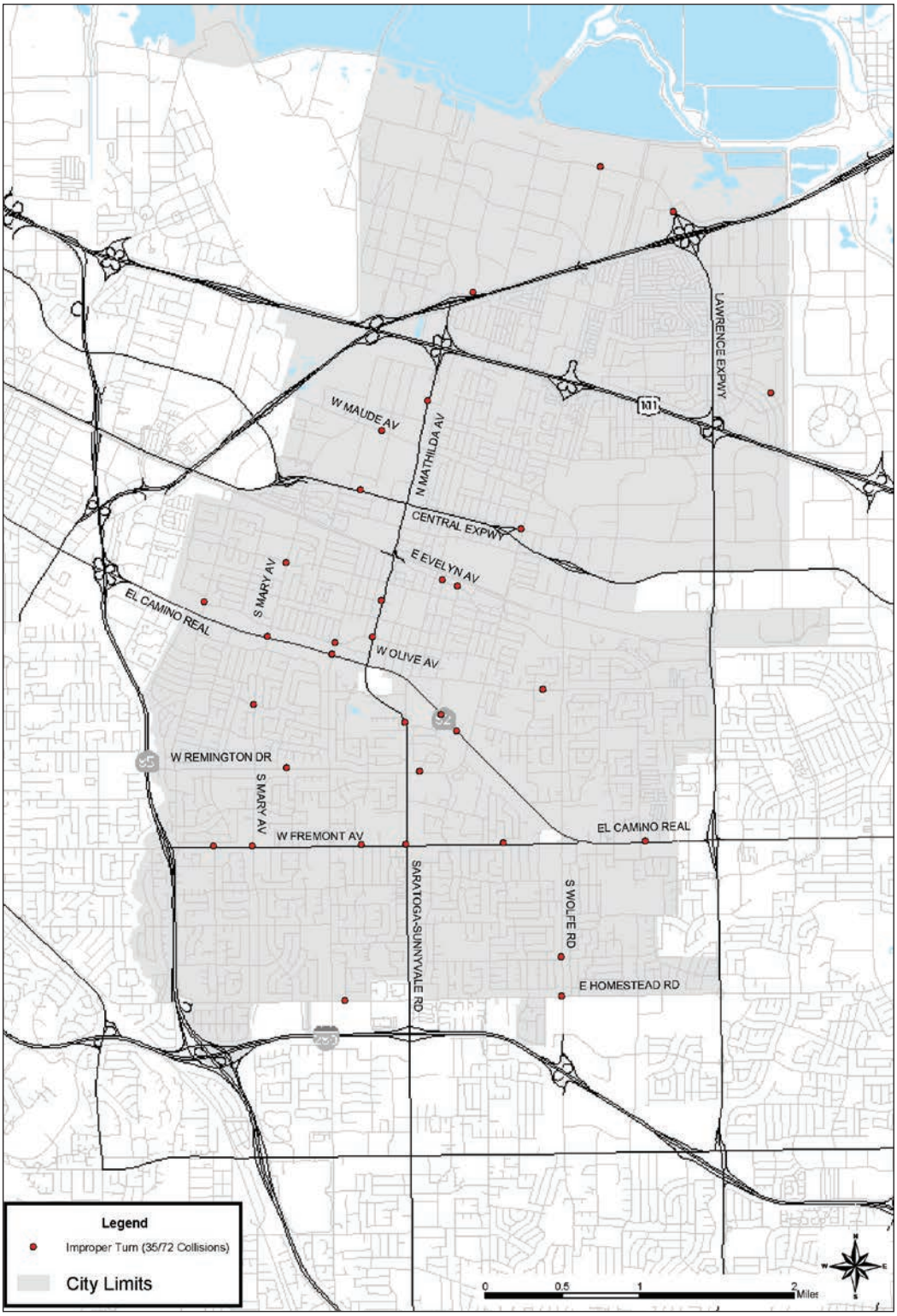


Figure D.14
Minor and Senior Bicylists in Bicyclist at Fault Collisions

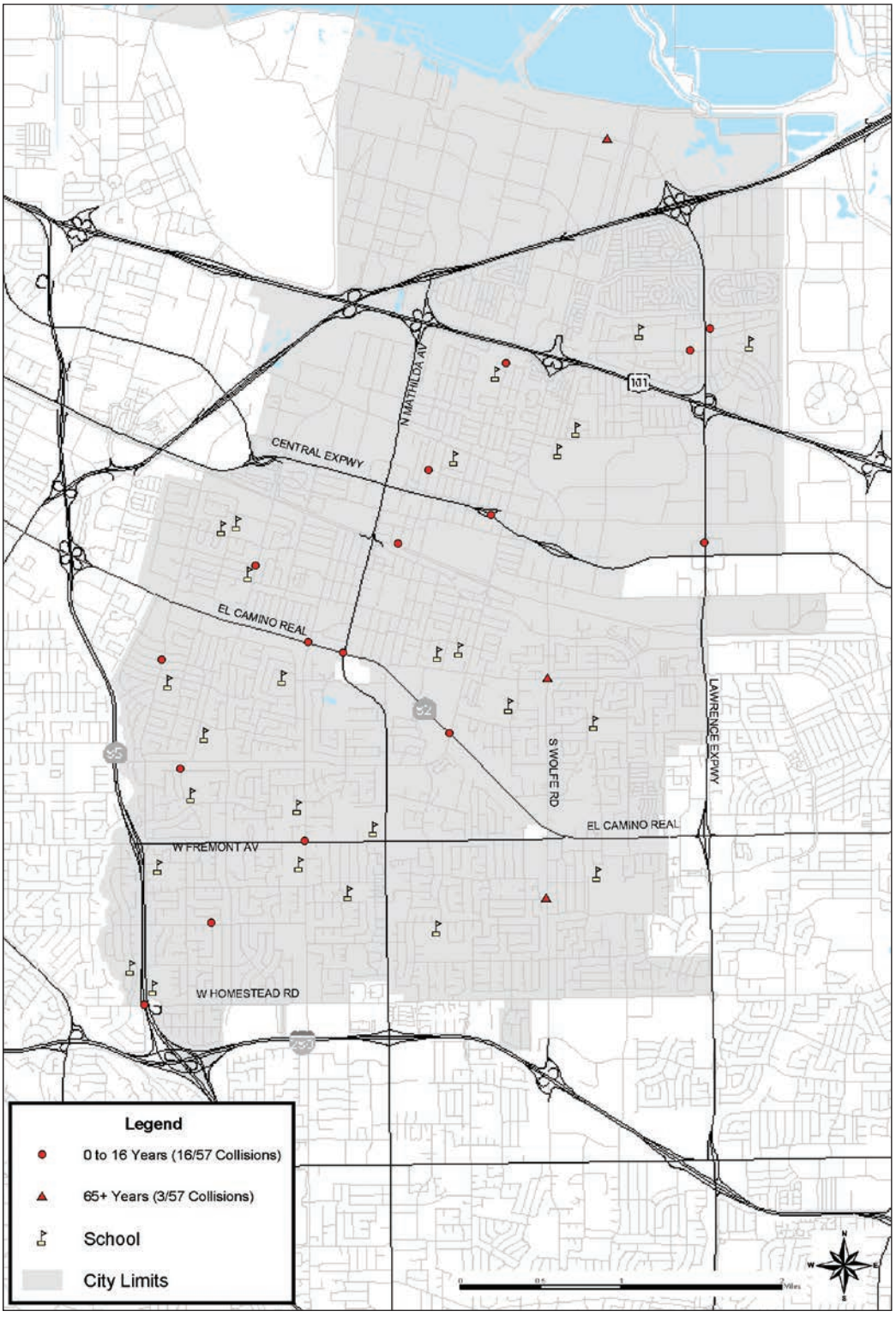


Figure D.15
Severe Injury and Fatal Collisions

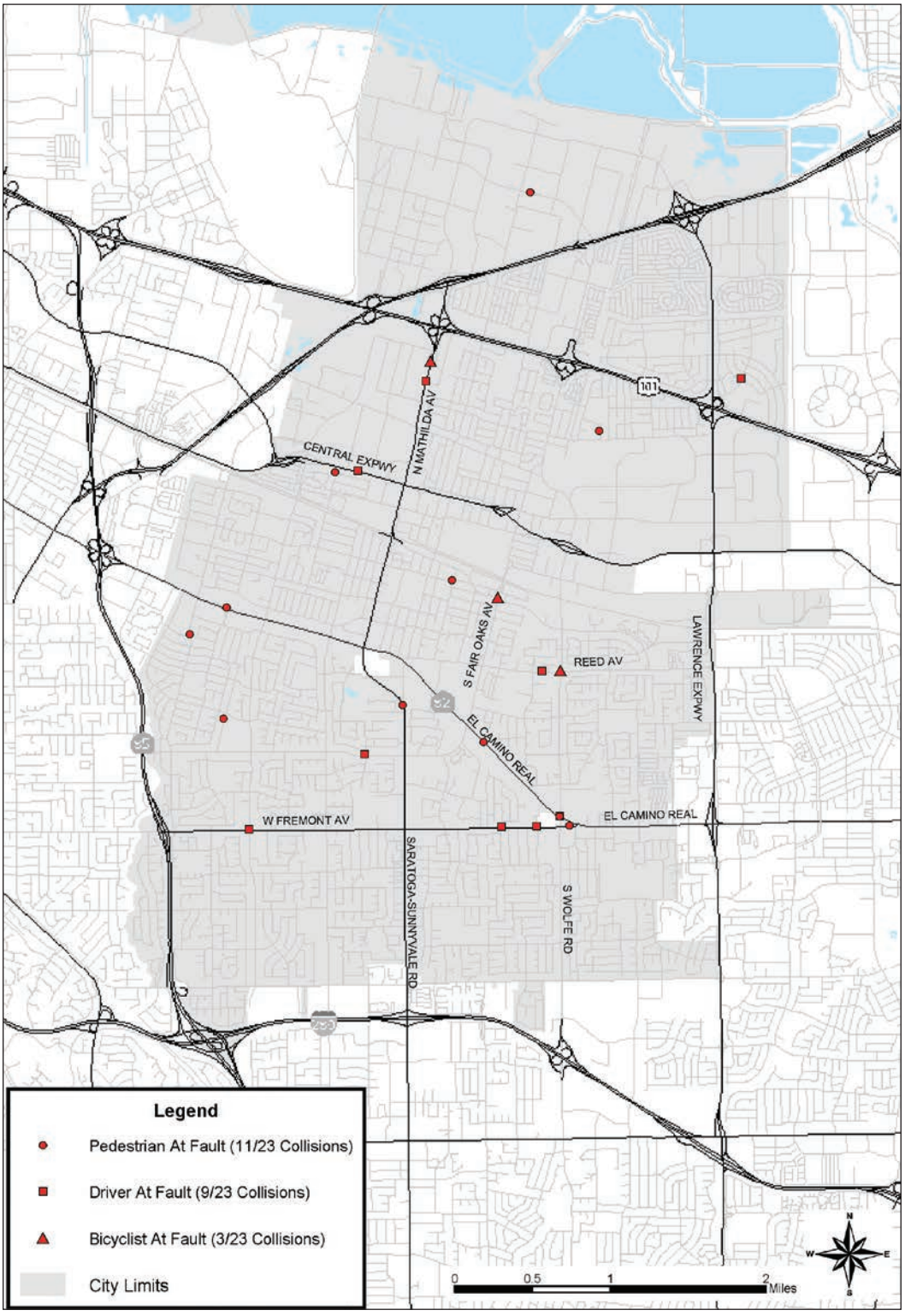


Figure D.16
Alcohol-Involved Collisions

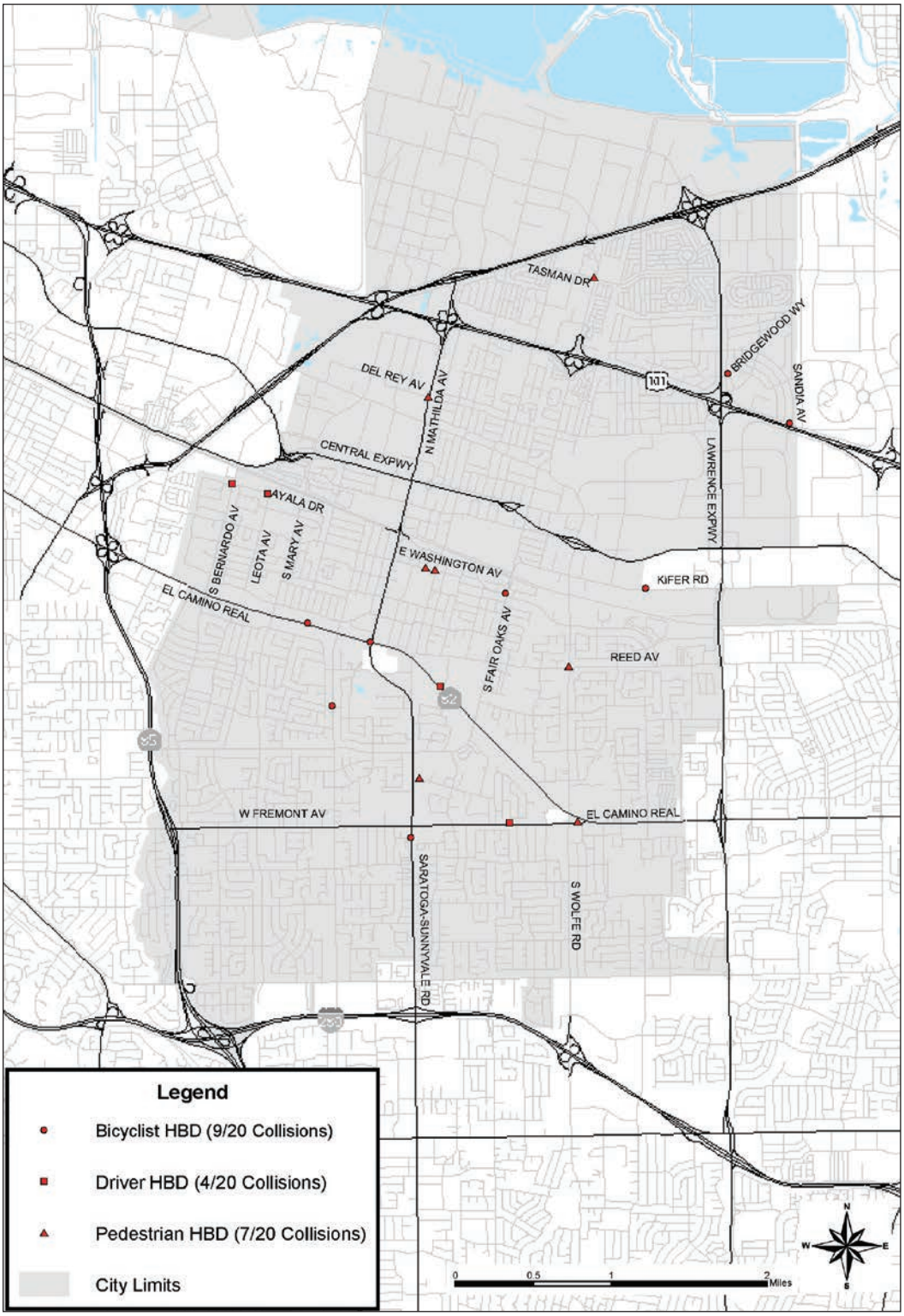


Figure D.17
Hit and Run Collisions

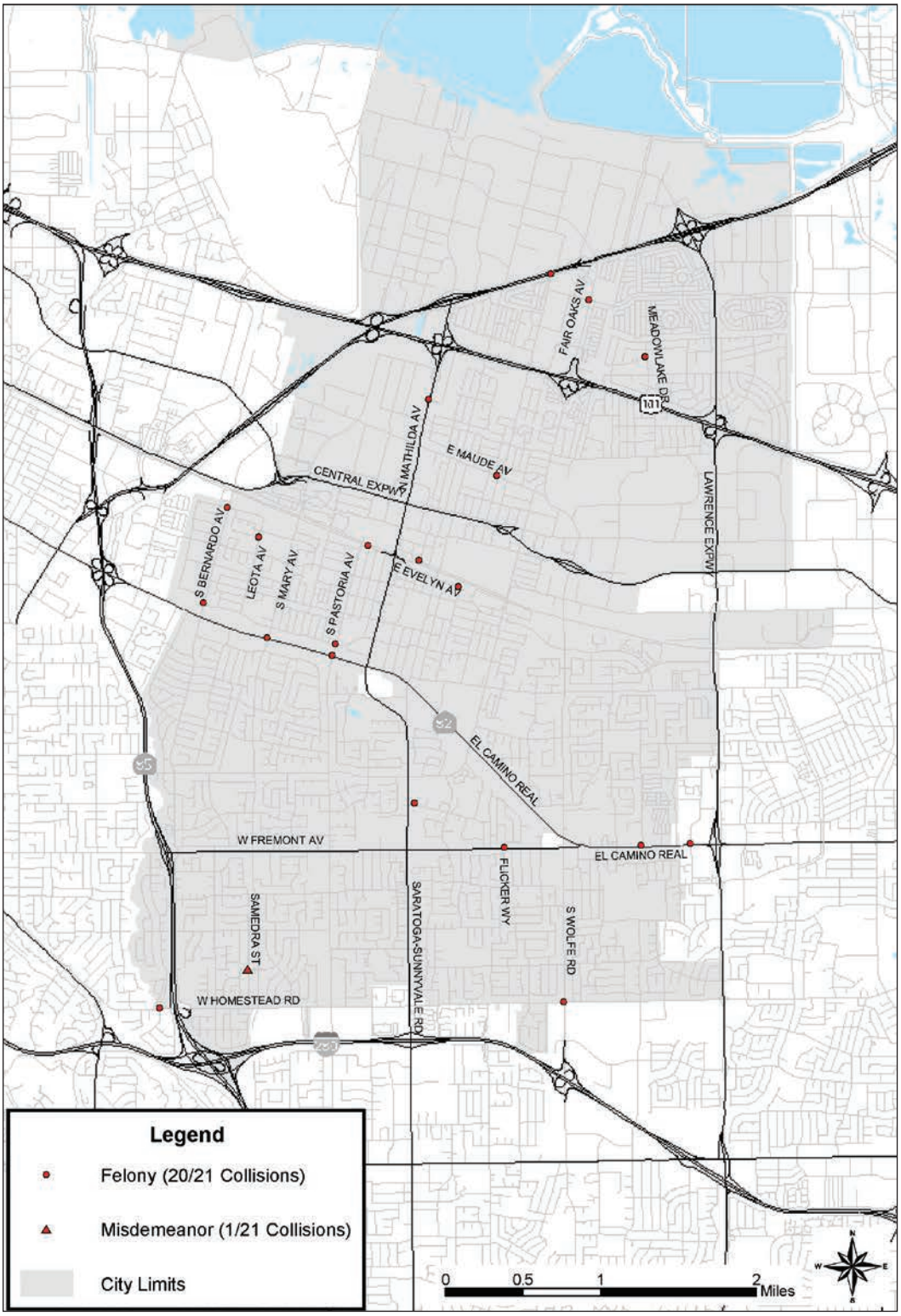


Figure D.18
Red Light Running Collisions

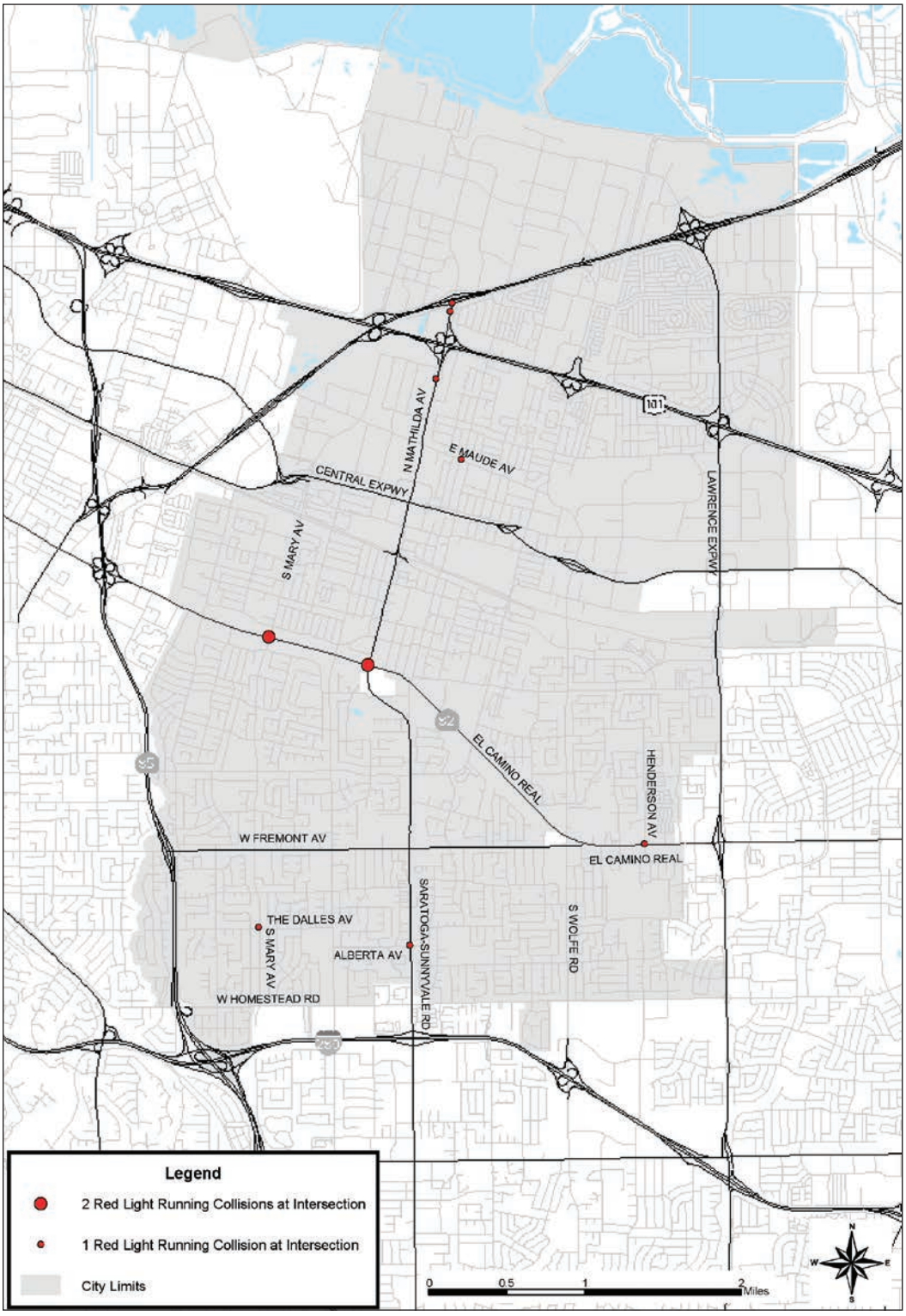


Figure D.19
Dark Lighting Conditions

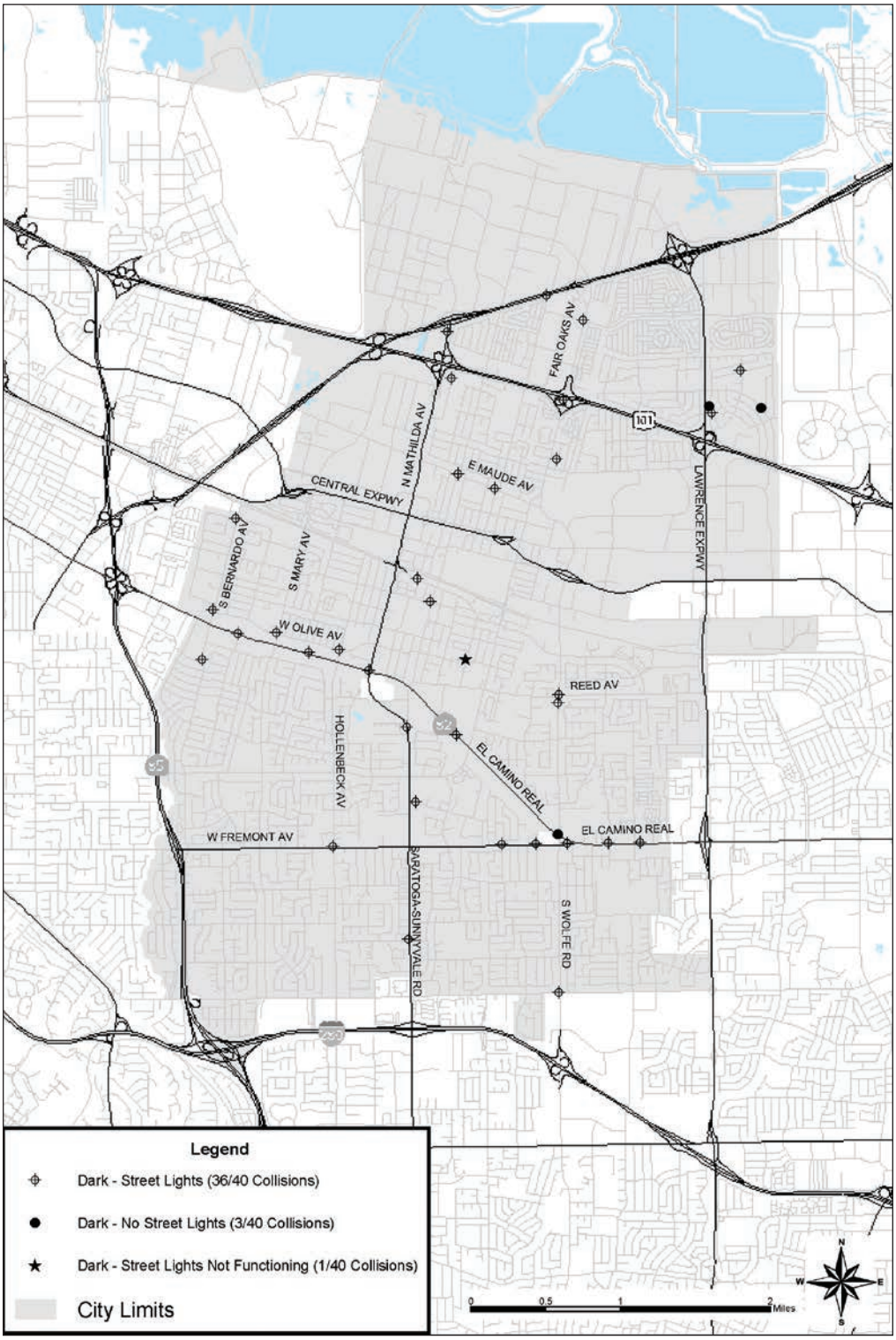


Figure D.20
West Weather Conditions

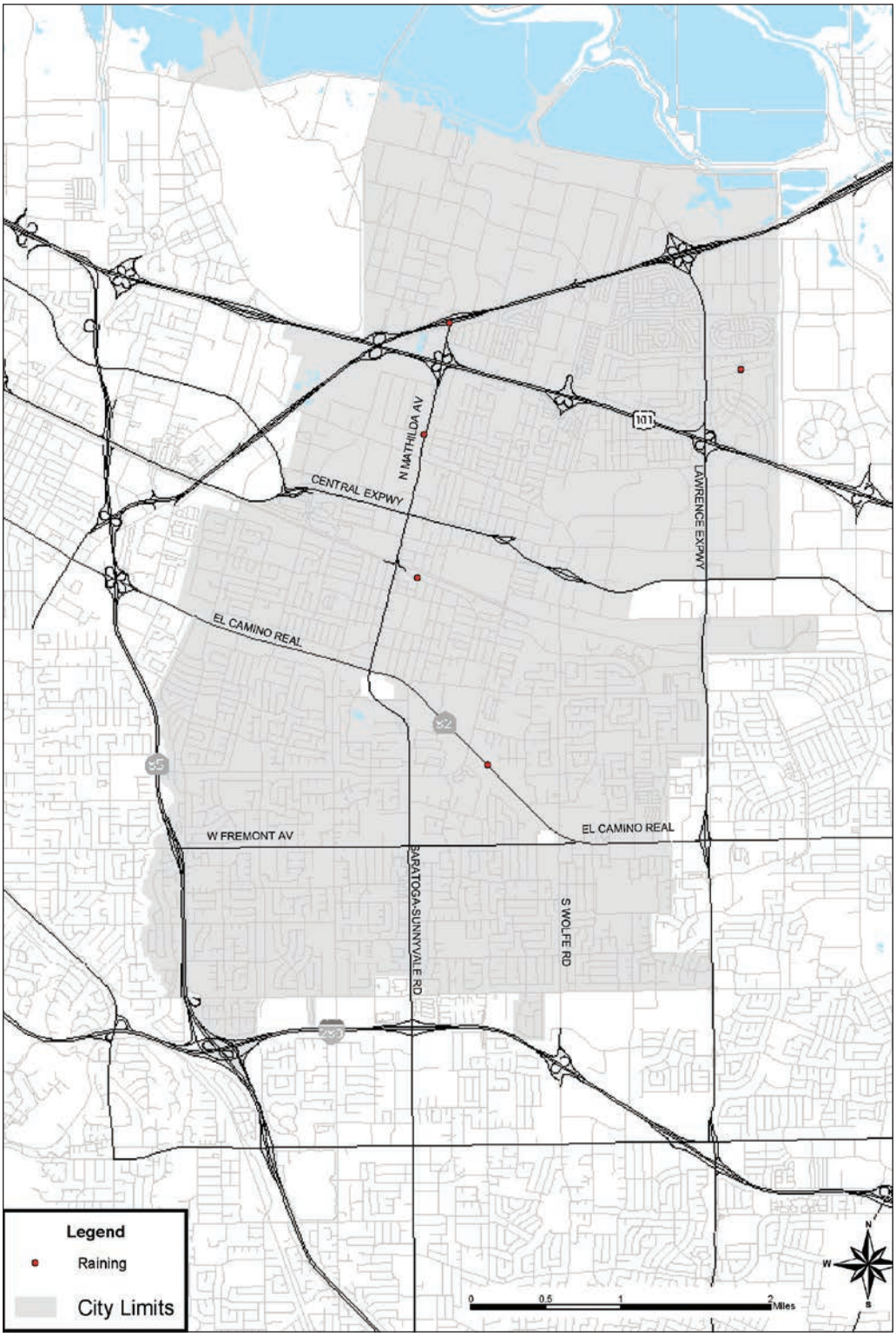
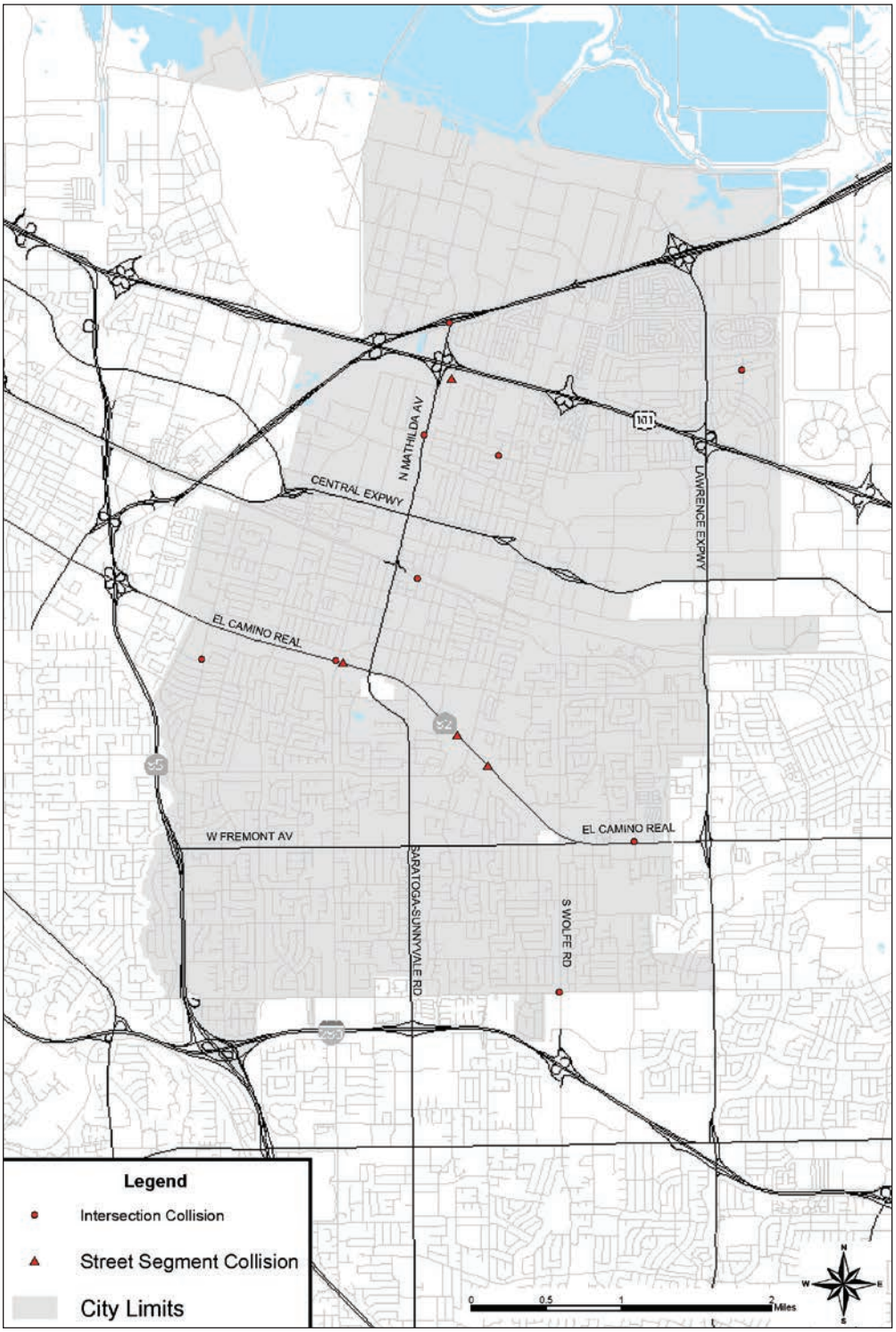


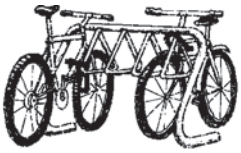
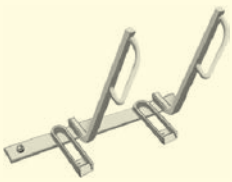
Figure D.21
We Road Conditions



Appendix E:
Sample Visual Guide to Bicycle Racks

Acceptable Types: Use at new sites, and to replace unacceptable types

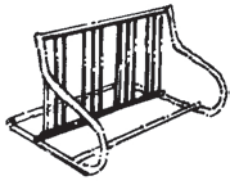
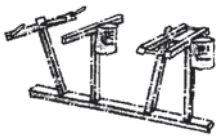
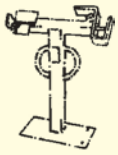
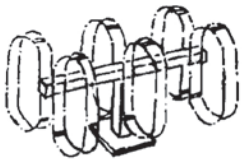
Figure E.1
Acceptable Bicycle Rack Types

Name	Shape	Description
"Wave" * also known as "Ribbon"		SUPPORT: Supports bike's frame acceptably, but does not prevent front-wheel "flop-over". SECURITY: Enables U-locking of frame and wheel. CAPACITY: 1 bike per upright in 2-sided sites. 1 bike per 2 uprights in 1-sided sites unless very wide spacing is specified.
Single Inverted-U 2 units shown		SUPPORT: Supports bike's frame acceptably, but does not prevent front-wheel "flop-over". Ideal rack for downtown sidewalk edge by car parking (orient plane of "U" parallel to curb in such sites). SECURITY: Enables U-locking of frame and wheel. CAPACITY: 2 bikes per "U" with ease, 4 if cyclists know how.
Multiple Inverted-U		SUPPORT: Supports bike's frame acceptably, prevents front-wheel "flop-over" once bike is locked. SECURITY: Enables U-locking of frame and wheel. CAPACITY: 2 bikes per "U" in 2-sided sites, 1 to 1.5 bikes per "U" in 1-sided sites due to difficulty of backing in every 2nd bike. Avoid narrow spacing - 36" U-to-U recommended; 30" minimum.
"Hanging Triangle" * Example: Cora "Expo" series		SUPPORT: Bikes lean against triangles suspended from top bar. Additional 2 bikes can lean against ends. Front wheels cannot flop over once bike is locked. SECURITY: U-lock through rack triangle, bike frame, and wheel. CAPACITY: 1 bike per triangle in 2-sided sites. 1 per 2 triangles in 1-sided sites. Add 2 bikes (for ends) in both cases.
Creative Pipe Lightning Bolt™ 2-bike 1-sided perpendicular model shown		SUPPORT: 3-point (down tube against post, plus 2 points on wheel well). Enables use of both hands to lock bike and remove cargo without risk of bike toppling. Front baskets clear posts. SECURITY: Loop on post enables U-locking of frame and front or back wheel. Posts slant back to accommodate all frame sizes. CAPACITY: 1 bike per post. OTHER: Available in 1-sided, 2-sided, and 1-sided-diagonal models, all using same post-and-wheel-well module. Stanford University's standard rack.

* = Nicknames

Unacceptable Types: Replace at all sites unless noted below

Figure E.2
Unacceptable Bicycle Rack Types

Name	Shape	Description / Recommendation
"Arc" * Single position shown		SUPPORT: One wheel, poorly. Bike can easily be pushed over by vandals. Suitable only as a display stand inside a bike shop LOCKING: Cannot lock frame. CAPACITY: 1 bike per wheel holder.
"Comb" * also known as **"Dishrack"** *, **"Ladder"** *, **"Wheelbender"** * One of many variations shown		SUPPORT: Supports only wheel except at ends. Bikes are easily pushed over, "pretzeling" the wheel, hence "wheelbender". SECURITY: Must lift bike over rack to lock frame, or else may lock only the wheel (rest of bike can be stolen), except at ends. CAPACITY: 1 bike per foot in 2-sided sites, 1 per 2 feet if 1-sided. Users often lock sideways against the "comb", blocking others. RECOMMENDATION: Retain at schools especially if in fenced and locked compound or in direct view of office staff.
PW Athletics "Loop-Rack"		SUPPORT: Supports bike acceptably by one wheel. SECURITY: Enables U-locking of frame but only if "stirrup" faces frame. 1-sided often set up backwards, defeating this. Rod easily cut. Wheel holders removable if nuts not immobilized. CAPACITY: 1 bike per wheel holder RECOMMENDATION: Retain at schools especially if in fenced and locked compound or in direct view of office staff.
"Rack III" 2-bike unit shown		SUPPORT: Supports bike frame and captures wheels between T-bars (1 fixed, 1 movable), but many "mountain bikes" do not fit. SECURITY: Captures frame and both wheels. Protects padlock, but most cyclists now use U-locks. Large U-locks fit around both T-bars, but few know this. Hence, not secure for typical user. CAPACITY: 1 bike per pair of T-bars
"Rally Rack" 2-bike unit shown		SUPPORT: Bracket is intended to support the bike's down tube, but many mountain bikes are too large to fit. Scratches paint. SECURITY: Cannot U-lock bike frame. CAPACITY: 1 bike per down-tube bracket (usually seen in pairs)
"Park-Rite" 2-sided shown; 1-sided available		SUPPORT: Supports only the end of one wheel. SECURITY: Cannot U-lock bike frame. Steel rod easily cut by hacksaw or bolt cutters. CAPACITY: 1 bike per wheel holder.

* = Nicknames

Appendix F:
Reference Information Used in Developing this Plan

F1. City of Sunnyvale Documents Reviewed

- City of Sunnyvale Bicycle Plan (2003, 1993 and 1984)
- City of Sunnyvale General Plan: Land Use and Transportation Element (1997)
- City of Sunnyvale Municipal Code Title 10: Vehicles and Traffic (2005)
- City of Sunnyvale Municipal Code Title 19: Zoning (2005)
- Sunnyvale Bicycle Opportunities Study (2005 and 1998)
- Tasman/Fair oaks Area Pedestrian and Bicycle Circulation Plan (2004)
- Moffett Park Specific Plan (2004)
- Downtown Sunnyvale Specific Plan (2003)
- Long Range Bicycle Capital Improvement Program Study (2000)
- Standard Operating Procedures: Bicycle and Pedestrian Safety Through Work Zones (2003)
- Association of Bay Area Governments (ABAG) Bay Trail Project (2005)
- Metropolitan Transportation Commission (MTC) Pedestrian and Bicycle Safety Technical Assistance Program (2004)
- MTC Regional Bicycle Plan (2001)
- Valley transportation Authority (VTA) Countywide Bicycle Plan (2000)
- Moffett Park Business and Transportation Association (MPBTA) 2005 Commute Mode Survey as it Pertains to Bicycle Transportation (2006)
- City of Mountain View Stevens Creek Trail Extension Project
- City of Mountain View Bicycle Map (2003)
- City of Santa Clara Bicycle Map (2004)
- South Bay Salt Ponds Restoration Project (2000)

F2. Agencies and Firms Contacted

- Association of Bay area Governments (ABAG)
- Santa Clara Valley transportation Authority (VTA)
- Caltrain
- City of Mountain View
- City of Santa Clara
- Lockheed Missiles and Space Company
- Moffett Park Business and Transportation Association (MPBTA)
- Ariba Incorporated
- School Districts: Sunnyvale, Santa Clara Unified, and Cupertino Union
- A number of Elementary, Middle and High Schools


CITY OF SUNNYVALE
CALIFORNIA